Environmental Sustainability and Landscape Management

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CONTENTS

Chapter 1

Landscape Architecture and Creating Innovative Spaces under Highway Overpasses

Yasemin CINDIK AKINCI[*], Sara DEMIR[*], Oner DEMIREL[**]

INTRODUCTION

The developing technology and increasing population in Turkey has led to an increase in transportation facilities (highway, air, sea, underground, train, etc.). Today, the most commonly used and economical mode of human transportation is highway transportation. It is the most important connection in the landscape between rural and urban areas. Highway design and construction is an important issue for transportation engineers, landscape architects and civil engineers.

With increasing population and urbanization, people have begun to shape nature in their way, and therefore the landscape is rapidly being damaged. Although highways are technologically important means of transportation, landscape architecture recognizes that they also divide the nature into two.

Increasing urbanization and technology has increased the need for transportation in the developing and changing world, including highways. As vehicular traffic increases, additional roads have been built to reduce traffic congestion and shorten travel distances. This has changed the landscape and highway transportation by directly affecting civil and transportation engineering.

Planning, design, planting and technical work are important ways to ensure sustainability in landscape architecture. The positive effects of technological development are undeniable. However, careless use, pollution and destruction of nature as if its resources were unlimited has raised the issue of sustainability.

Sustainable landscape architecture creates ecological designs for the outdoor and urban environment. It begins with appropriate systems which address function, cost, energy efficiency, beauty, the and environment (Bean & Yang (Mayla), 2009). Sustainability may then be defined as maintaining well-being over a long, perhaps even an indefinite period. This covers largely the environmental dimension of the triple bottom line, but environment and sustainability are not synonymous. On the one hand, some forms of environmental degradation are both relatively easily reversed and highly noxious in the present-many forms of air and water pollution, for instance (Kuhlman & Farrington, 2010).

The highway is the most common transportation mode in Turkey. With the increase of highway network due to the rapid urbanization and technological development in the city context, covering impervious surface and plane routes, dividing and degrading the city habitats, and forming pollution have posed changes in landscape. Open green areas are significant signs of a good quality of life in urban areas.

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Increasing numbers of viaducts and bridges are being built to facilitate transportation in narrow spaces, ensuring safe passage and reducing travel distances.

The flyovers, perceived as an emblem of modernity are aimed at alleviating congestion, promoting economic development, and enhancing connectivity with distant communities overlooking their voids in the neighborhoods (Kabir, 2014). The term 'flyover' is used in the United Kingdom and most Commonwealth countries and is defined as a bridge that carries a road or railway over another road ("Flyover"). The roadway is more of an overpass, however commonly accepted as a flyover by the city people (Roushan, 2013).

Undefined, unusable spaces have emerged as the number of highways has increased in line with the needs and demands. The areas under highway viaducts and bridges are defined as unused spaces, in other words, dead spaces. Landscape architecture sees them as part of urban space's landscape system, land use, traffic and public areas.

Revitalizing lost spaces is a workable way in order to decrease the negative effects resulting from inefficient urban spaces and the problems associated with land shortage in large cities (Akbarpour & Tabibian, 2015). Lost space can be regarded as the leftover unstructured landscape at the base of high-rise towers to the unused sunken plaza away from the flow of pedestrian activity in the city. Lost spaces are also abandoned waterfronts train yards, vacated military sites, and industrial complexes (Trancik, 1986). Leftover spaces could occur next to a planned development or along and under highways and railways, often stumbled upon but unnoticed, publicly owned or no man's land, land set aside for greening but not developed or the abandoned old building yards and dockyards (Qamaruz-Zaman, Samadi & Azhari, 2012). Undeveloped spaces below elevated highways have the potential to be transformed into major corridors, gathering areas or recreational spaces that integrate the elevated highway and their surrounding environment (Irizarry, 2003).

Dark and neglected that's the kind of derelict space that lurks below most highways and elevated roadways. Cities in the process of densifying, however, can no longer afford to ignore such concrete underbellies (Rochon, 2013).

The spaces under the overpasses, bridges and any kind of urban infrastructure are regarded as perilous, negative, and overbearing. However, architects and urban designers consider that these spaces have potential to be transformed into distinguished space having visual pleasure (Chohan, 2014). In addition, these places can shelter the homeless and people with bad behaviors can congregate under them since they are protected from the rain and sun. Therefore, they have a negative effect.

The spaces under the highway bridges are largely neglected. However, these spaces provide the connection with urban areas and can have many designs and uses. Designing them properly will reduce their frightening, cold and dark effect and enable people to use them.

There have been many worldwide studies, which used "*highway overpasses*" Trancik, (1986); Jo, Lee, Oh & Rhee (2007); Roushan, (2013); Chohan (2014); Prasetyo & Martin-Iverson (2015). Highway landscape studies have also been used for revegetation in Turkey; Seçkin (1986); Altınçekiç & Altınçekiç (1999); Tunay, Yılmaz & Ateşoğlu (2008); Dağıstanlıoğlu & Önder (2009); Ertekin & Çorbacı (2010).

MATERIALS AND METHODS

This study aims to demonstrate that the spaces under highway bridges can be used for the common benefit of society. In addition, it addresses the importance of evaluating and planning these areas as close or open areas for larger project ideas.

The study aims to solve the problem of negative effects of space under the highway overpass. The opportunities were evaluated after observation, and the uses are considered to be valid when the area is planned. This study examined the spaces under highway bridges in Trabzon.

Definition of space under highway overpasses

Overpass means a structure carrying a highway over a road or lesser highway. Flyover means a structure carrying one-way traffic over a highway from one highway to another highway (CHBDC, 2007). With highways enlarged and renovated in line with the needs in previous years, highway bridges have been built in Turkey's urban areas. These bridges are on valuable urban land, and the spaces under them have negative effects.

Cities have spaces around them which interact with people. These areas can be dark, short, unpleasant, abandoned spaces which are full of girders and include ill-shaped areas in some places. They are restricted spaces that have scarcely any social or physical functions.

Loose space emerges in a variety of types of urban locations, some planned for specific uses (planned public open space) and others without assigned functions (leftover and abandoned spaces). They are all accessible to the public. (Franck & Stevens, 2007). They may be found at the edge of transport routes; canals, roads or railways, at the edge of new developments or empty plots nestled between occupied spaces and buildings (Shaw & Hudson, 2009). Designs should be created with users in mind to give meaning to spaces and make them more useful. Some operations and arrangements for strengthening the spatial identity of these spaces and bringing vitality and variety to them are opportunities to make the environment more beautiful.

Alternative activities under highway overpass

Loose space has generally been disregarded for conventional public use because of its shape, size or visible lack of economic function (Harper, 2013; Németh & Langhorst, 2014). The spaces under the bridges should be used actively. Otherwise, they will have a bad image and lead to undesirable uses.

Many innovative design ideas and solutions can be seen around the world in the spaces under bridges. These spaces may be small or large. They are usually shady, dim and neglected. They sometimes play an important role in connecting different areas to each other. Therefore, these areas should be analyzed well and opened for active or passive uses. However, another issue that should be considered in design is that they are under traffic routes. This means noise, vibration, dust, security and visual quality should also be taken into consideration.

Usually, temporary solutions such as green areas are recommended for the spaces under highway bridges. From the perspective of people's needs, the walls of the piers of the bridge can be colored artistically or illuminated. Market stalls, stations, plantations, cafes, parking areas, or sports areas can be established. Entertainment, recreation or education spaces can be established for children. Open-air stages can be founded. Buffets or small shopping malls can be established in these spaces. They also can be used as transit passages (Figure 1-2).

Figure 1. Recreational activities under bridge (URL-1-2-3).

Figure 2. Community activities (URL-4-5-6).

The Spaces Under Trabzon's Highway Overpasses

The increasing urbanization and vehicles in Turkey in recent years has led to a need for the construction and planning of new roads. The links and passages between the roads are provided by viaducts as technology has developed. Roads with high bridges created by viaducts generate unused spaces under them. These spaces have become living places for the homeless since people at first abstained from using these areas which have an unpleasant, frightening and bad image. This is because they are protected from sun and rain. Then, usable places have begun to draw attention under these bridges. Posters are hanged or things about love, politics, reproach, or poem are written on the walls in some spaces under highway bridges to draw attention in the daytime since they are passages that connect places to each other. Later, these areas play an active role with their urban uses.

Gülbahar Hatun Bridge

Gülbahar Hatun Bridge is part of a highway with busy urban traffic. It kinks people with their culture and history. Gülbahar Hatun Bridge has a visual impression as it is situated at the bottom of a valley with its viaduct piers. In addition, the bridge passes over the Zağnos Valley, which is where the city takes a breath of fresh air. This valley in a stream bed is surrounded by the historical walls of the city. It was an unplanned settlement, but has been redesigned for recreational purposes as a public area by urban transformation. The free fields under the piers of the bridge were planted, small ponds and walking paths were created, and the area was put into service with picnic and sitting areas. The sidewalk on the bridge is also used by pedestrians (Fig. 3).

Emperyal Bridge

The Emperyal Bridge transports people from the square to the coast and the coastal highway. Pedestrians actively use the spaces under and on the bridge. The space under the bridge has bus stops, restrooms, parking lots and pedestrian passage routes (Fig. 4). In addition, traffic actively moves in two directions under the elevated bridge. The unpleasant looking parts of the bridge have been covered with plants, and its pier columns have been decorated with murals.

Figure 3. Space formation and usage under Gülbahar Hatun Bridge

Figure 4. Parking lots, bus stop, decorated murals, pedestrian passage routes under highway overpass

Figure 5. Hedge planting to hide bad image and restrooms

The Bridge Kemerkaya that connects Trabzon's National Coastal Highway to Moloz

Bus platforms were built in the space under this highway bridge in the Kemerkaya neighborhood. The viaduct has an active residential area around it. Traffic moves rapidly on and under the bridge. Parking areas were constructed around this space since school buildings and a private hospital are located nearby. In addition, this highway bridge is connected to the coastal walking trail. Therefore, stair passages were used to provide pedestrian access. Bus stops and platforms exist for municipal buses. The bridge also has buffets and restrooms under it (Fig. 6).

Figure 6. Parking areas and bus station platform under highway overpass

Reşadiye-Moloz Overpass

This bridge was recently built to resolve traffic problems. There are large spaces and link roads under the bridge. These spaces have yet to be utilized; however, a user group is utilizing some places for parking and pedestrian crossing (Figure 7). There is active traffic on both sides of the bridge underway. Further, there are too many link roads around this space. Therefore, this area can be gained visual impression keeping the high number of link roads in mind.

Figure 7. Reşadiye-Moloz Overpass space

Hagia Sophia Overpass

This highway bridge in the Hagia Sophia neighborhood has very large and usable spaces under it. In addition, very active pedestrian passages exist under this bridge. There are also parks and a coastal walking trail leading to the sea. The spaces under the bridge were planted with vines (Figure 8). This space also has traffic flowing through it. There are billboards on the circular junction in the area, and the piers of the viaduct have written messages on them (Figure 9).

Figure 8. Planted space under bridge

Figure 9. Active pedestrian passages and billboards under highway overpass which connected coastal walking trail

The area was used for planting due to its relation to the coast and parks. However, its width, height and location can enable a variety of social, economic and aesthetic uses.

Çömlekçi Overpass

This bridge, located on the highway in Çömlekçi, links the coastal road directly to the city central square. There is a large-scale planting in the space under the bridge with a variety of uses. The plants can be both sold and transplanted in this area. Furthermore, people randomly used it as a parking area here to meet their needs. The bus stops around the parking area allow for gas stations and planting (Fig. 10).

Figure 10. Nursery and parking area

Yüzüncü Yıl Overpass

This viaduct passes through the middle of the Yüzüncü Yıl Park. The park is a picnic and recreation area. The active highway bridge passes over the area that links the park to the sea. There is an inactive and empty space under this bridge. It is a neglected area that is not harmonized with the environment now. Although the space is empty, people have picnics under the bridge (Fig. 11). Traffic flow, planting and posters exist where the viaducts' columns join the road. Sustainability can be ensured since this is a recreation area (Fig. 12). It can also be considered a passage that links the area to the coast. The area is usable in terms of width, height and location.

Figure 11. Not organized empty space under viaduct and picnic area

Figure 12. Planting and posters exist where the viaducts' columns join the road

Figure 13. Bus stops, billboards, murals announcements, and pedestrian passages under highway overpass

Forum Overpass

This viaduct is located in the Kalkınma neighborhood, around a large shopping mall, the university and the junctions of Farabi hospital. The area is very active in daytime and at night. However, planning and arrangements have been done randomly. Planting, murals announcements, billboards and bus stops exist in the space under the viaduct. The space under the bridge enables pedestrians to reach these areas (Fig. 13).

Meydan Tanjant Overpass

The Tanjant Bridge in the square has bus stops and taxi stands under it. There is also a parking area for vehicles and motorcycles (Figure 14). The area has roads and links around it. The columns of the bridge were decorated with paintings. Benches and seats were added, and planting was done in the area (Fig.15). The area is multifunctional since it is around the square. It allows for any kind of activities.

Figure 14. Share taxi and parking area under Tanjant Bridge

Figure 15. Dolmush stops, connecting roads under Tanjant Bridge

DISCUSSION AND CONCLUSION

Recent studies in Turkey show that efforts have been made to make the spaces under highway bridges functional. These spaces usually are not taken into consideration during design and planning. The spaces spontaneously acquire an identity based on the users' preferences. Users do not prefer the spaces under highway bridges due to their gloomy and dark atmosphere. Therefore, work should be done to diversify user profiles when designing these spaces.

These spaces actually have many uses. Various ideas of design and meaning can be generated for their future use. The height and width of the spaces under the bridges are effective factors in their utilization. Simple planting and randomly or designed parking areas draw attention in these spaces in Turkey. Mostly the creeping or holding plants have been used in these dark, shady and cold areas. In addition, some of these areas have illumination problems.

The elevated highways and bridges built in Trabzon due to increasing vehicle traffic create spaces under them. Graffiti, bus stops and platforms, plantations, city parks, parking areas, buffets, transit passages, sidewalks, posters and billboards are to be found in these spaces. Previous studies have found similar uses (parking areas, bus stops, transit roads, etc.). Improvement works and arrangements should be conducted to improve these areas and harmonize their design and functions with Trabzon's historical identity. With new arrangements, additional functions can be added to these spaces which have been randomly created. Areas for exhibitions, cinema, theater, games, illumination, cultural activities, and food and beverages can also be built in these spaces.

The temporary uses of these spaces can give ideas for larger designs and use. In short, temporary use does not offer a permanent solution for the sustainability of these spaces. These areas should be addressed as part of their environment. In conclusion, these areas should be given identity and spirit when they are planned and designed. The results of this study should be evaluated in line with the areas and their environment, considering the future circumstances.

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Chapter 2

Visual Landscape Assessment of the Alpine Rocky Habitats: A Case Study of Hatila Valley National Park, Artvin, Turkey

Derya SARI[*], Cengiz ACAR[**]

INTRODUCTION

In recent years, the visual quality of landscape has become a significant component of planning and management strategies (Daniel, 2001). Historically, visual beauty plays an important role in landscape protection as it is a main determinant of visual perception (Val *et al*., 2006). The visual quality of landscape can be defined as "relative aesthetic perfection of a landscape" (Daniel, 2001) and evaluated according to the observer's perspective (Lothian, 1999; Val *et al*., 2006).

There are two main paradigms in landscape aesthetics theory; both constitute the basis of landscape assessment methods: "objective" paradigm (visual quality is an inherent feature of the nature) and "subjective" paradigm (landscape quality is determined according to the observer) (Lothian, 1999; Val *et al*., 2006; Skrivanova & Kalivoda, 2010). According to these two approaches, landscape assessment may differentiate. In the "expert-based" approach, the biophysical features of the landscape are transformed into the formal parameters (form, line, variety) accepted as the indicators of landscape quality (Daniel, 2001; Val *et al*., 2006; Skrivanova & Kalivoda, 2010). In the "perception-based" approach, the visual aesthetic quality of landscape can be considered as an output of the visible features of the landscape interaction with psychological experiences of the human observer (Daniel, 2001). This approach can be assessed with sensory-perceptual parameters or cognitive approximations (Val *et al*., 2006; Skrivanova & Kalivoda, 2010).

Today, it is seen that many countries make an effort to describe, assess and reveal the characteristics of their natural landscapes. Within this concept, considering the situation in Turkey, it can be said that the relevant studies are still insufficient. Similarly, the studies on rocky habitats, a part of the natural landscape in Turkey, are inadequate in terms of both floristic and visual assessment. However, in landscape architecture which is a scientific discipline of nature design, the assessment of nature and its components in terms of creating resources for sustainable planning and designs is a subject that needs to be emphasized.

Rocks and stones observed everywhere in nature from tropics to arctic regions, from forests to deserts, from summits to seasides, have been a source of inspiration for people in the formation of rock gardens with vegetation covers. Rocks, stones, and gravels in different forms around the world are in a perfect balance and coherence with

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a wide variety of plants (McGary, 2003). Nowadays, rocky habitats not only provide opportunities for recreational activities and create a focus on some nature protection and national parks but also at a small scale, rocky habitats can be considered as special designs of landscape as rock gardens in landscape architecture. In order to plan fictionalize natural patterns in landscape design projects implementations, first, the visual effect of these patterns on the user needs to be assessed. Natural rocky habitats are also one of the subjects that need to be examined within this concept. Particularly alpine rocky habitats can be assessed as more attractive areas with their different biodiversity and visual values. Consequently, this study aims to identify the visual quality and preferences of the potential users of natural alpine rocky habitats from Northeastern Anatolian highlands. Value of the sample areas chosen from alpine rocky habitats, a part of the natural landscape.

MATERIALS AND METHODS

Study Area and Selection of the Sample Areas

Hatila Valley National Park (HVNP), the study area, is located in the Central district of Artvin province, between 41°10'0.054.66" Arctic circle and 41°44'11.19" East longitudes (URL, 2009). The Hatila Valley located 30 km west of Artvin province has a total area of 16988 hectares. The altitude of the area’s highest point is 3224 m (Kurt Mountain), and the altitude of its lowest point is 160 m (Çoruh River) (Anonymous, 2005) (Fig 1). The ecosystem of rocky habitat in Hatila Valley National Park covers a 1045-hectare area.

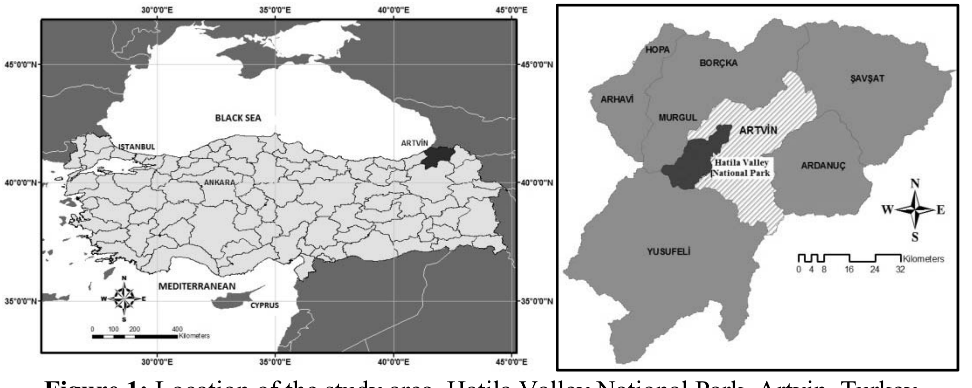

Figure 1: Location of the study area, Hatila Valley National Park, Artvin, Turkey

"Caucasian Ecological Region", where Hatila Valley National Park is situated, is defined by the International Environment Protection Agency, World Bank and GEF (Global Environment Facility) as one of the most important 25 terrestrial ecological regions of the world, which are threatened areas but the richest in terms of biological diversity (Karaer & Terzioğlu, 2012).

Within this study, a total of 50 outcrop and scree samples from attractive natural rocky habitats in the alpine areas of 2200 m above of Hatila Valley were assessed. Field studies were performed in June, July and August between 2009 and 2012. The photos in field studies were taken with DSLR cameras. The photos taken in sample areas were made panoramic by putting them together with ArcSoft Panorama Maker 4 software.

Determining of Landscape Visual Attributes

Within this study, literature resources were examined to determine the attributes for landscape visual assessment. There are many studies on visual perception, preference, and assessment of both urban and rural landscape. Upon examining these studies, various parameters/attributes used in visual assessments were identified. Visual assessment attributes obtained as a result of literature studies were grouped under the titles of perceptual-sensory and physical-ecologic. Accordingly, a total of 25 attributes related to the topic of the study were selected for visual landscape assessment (diversity, complexity, coherence, unity, dynamism, mystery, color, shape-form, texture, impressiveness, beauty, uniqueness-originality, familiarity, invitingness, pleasantness, safety, excitingness, relaxedness-calmingness, interestingness, attractiveness, wildness, field form (topography), vegetation, silhouette, worthiness for protection) (Table 1)

Table 1: List of 25 selected landscape visual attributes.

Visual Attributes		References
Perceptual / Sensory	Worth preserving	Sevenant & Antrop (2009), Matthies *et al*. (2010)
	Diversity	Taylor *et al*. (1987), Bell (1999), Germino *et al*. (2001), Clay ve Smidt (2004), Kalın (2004), Val *et al*. (2006), Rogge *et al*. (2007), Acar & Sakıcı (2008), Surova & Pinto–Correia (2008), Fry *et al*. (2009), Sevenant & Antrop (2009), Matthies *et al*. (2010), Acar *et al*. (2013)
	Familiarity	Taylor *et al*. (1987), Kim & Kang (2009), Sevenant & Antrop (2009), Matthies *et al*. (2010)
	Complexity	Kaplan *et al*. (1998), Bell (1999), Germino *et al*. (2001), Kalın (2004), Tveit *et al*. (2006), Val *et al*. (2006), Çakçı & Çelem (2009), Chon & Shafer (2009), Fry *et al*. (2009), Kim & Kang (2009), Garcia–Moruno *et al*. (2010)
	Coherence	Özbilen (1983), Herzog (1992), Kaplan *et al*. (1998), Bell (1999), Tveit *et al*. (2006), Val *et al*. (2006), Acar & Sakıcı (2008), Chon & Shafer (2009), Fry *et al*. (2009), Kim & Kang (2009), Ode *et al*. (2009), Sevenant & Antrop (2009), Acar *et al*. (2013)
	Uniqueness, Originality	Özbilen (1983), Herzog (1992), Acar & Sakıcı (2008), Chon & Shafer (2009), Fry *et al*. (2009), Sevenant & Antrop (2009), Acar *et al*. (2013)
	Unity	Clay & Smidt (2004), Cañas *et al*. (2009), Fry *et al*. (2009), Kim & Kang (2009), Sevenant & Antrop (2009)
	Dynamism	Nasar (1988), Chon & Shafer (2009), Kim & Kang (2009), Zhang & Lin (2011)
	Beauty	Oostendorp & Berlyne (1978), Taylor *et al*. (1987), Nasar (1988), Val *et al*. (2006), Surova & Pinto – Correia (2008), Kim & Kang (2009), Sevenant & Antrop (2009)
	Color	Taylor *et al*. (1987), Arriaza *et al*. (2004), Bell (2004), Sheppart (2004), Val *et al*. (2006), Acar & Sakıcı (2008), Cañas *et al*. (2009), Garcia – Moruno *et al*. (2010)
	Shape, Form	Bell (2004), Sheppart (2004), Val *et al*. (2006), Cañas *et al*. (2009), Garcia–Moruno *et al*. (2010)
	Texture	Bell (2004), Sheppart (2004), Cañas *et al*. (2009), Garcia–Moruno *et al*. (2010)

Table 1: (continued)

Visual Attributes		References
Perceptual / Sensory	Mystery	Taylor *et al.* (1987), Nasar (1988), Herzog (1992), Kaplan *et al.* (1998), Bell (1999), Germino *et al.* (2001), Kalın (2004), Val *et al.* (2006), Surova & Pinto–Correia (2008)
	Invitingness	Taylor *et al.* (1987), Nasar (1988), Chon & Shafer (2009), Sevenant & Antrop (2009)
	Pleasantness	Oostendorp & Berlyne (1978), Özbilen (1983), Taylor *et al.* (1987), Nasar (1988), Surova & Pinto–Correia (2008), Chon & Shafer (2009), Kim & Kang (2009), Zhang & Lin (2011)
	Safety	Nasar (1988), Surova & Pinto – Correia (2008), Chon & Shafer (2009), Kim & Kang (2009), Zhang & Lin (2011)
	Exciting	Nasar (1988), Chon & Shafer (2009), Zhang & Lin (2011)
	Relaxedness, Calmness	Özbilen (1983), Nasar (1988), Acar & Sakıcı (2008), Surova & Pinto – Correia (2008), Zhang & Lin (2011)
	Interestingness	Oostendorp & Berlyne (1978), Taylor *et al.* (1987), Nasar (1988), Acar & Sakıcı (2008), Çakçı & Çelem (2009), Kim & Kang (2009), Zhang & Lin (2011)
	Attractiveness	Nasar (1988), Acar & Sakıcı (2008), Surova & Pinto–Correia (2008), Acar *et al.* (2013)
	Impressiveness	Özbilen (1983), Nasar (1988)
Physical / Ecologic	Borders form, Silhouette, Horizon	Germino *et al.* (2001), Arriaza *et al.* (2004), Sheppart (2004), Ode *et al.* (2009), Phillips *et al.* (2010)
	Field form, Topography	Germino *et al.* (2001), Bell (2004), Sheppart (2004), Val *et al.* (2006), Cañas *et al.* (2009)
	Vegetation, Flora	Nasar (1988), Germino *et al.* (2001), Arriaza *et al.* (2004), Bell (2004), Sheppart (2004), Rogge *et al.* (2007), Cañas *et al.* (2009), Phillips *et al.* (2010)
	Wildness	Nasar (1988), Arriaza *et al.* (2004), Acar & Sakıcı (2008), Acar *et al.* (2013)

Questionnaire Survey

Visual assessment technique based on photograph evaluations and scoring is the most preferred approach in determining visual perception studies of landscape architecture. The survey study includes two stages. Firstly, the visual quality values of 50 photos (scenes) representing the sample areas were determined. In the survey form prepared for the first survey study, the information related to gender, age, education status, occupation and income status of the participants was questioned. Afterwards, the participants were asked to mark participation levels for the judgment "*The visual quality (aesthetics) of the rocky habitat in this photo is high*" for each scene shown.

The first survey study was implemented on 160 people in total consisting of 32 landscape architects, 34 landscape architecture students and 94 people from the other occupations (academician, teacher, worker, student, housewife, officer, freelancer, doctor, retiree and unemployed). At the second stage of the survey study, the photos of 50 sample rocky habitats were grouped according to the obtained visual quality score (VQS). The hierarchical cluster analysis dendrogram specifying photo groups was obtained with PAST 3.12 software. In this way, the visual preference and assessment survey examining 25 visual assessment attributes for the most preferred 16 photos in the first group was applied to 30 experts from the landscape architecture discipline.

Fractal Analysis

In the visual assessment of rocky habitats, both subjective and objective approaches were used. Therefore, the Fractal Analysis method assisting the objective analysis of natural patterns with mathematical methods was used.

In some studies on visual quality perception of landscape, the relation between the fractal dimension value of landscape images and quality perceptions of people was examined (Hagerhall *et al.*, 2004; Taylor, 2006; Cooper *et al.*, 2010; Pihel, 2011). Accordingly, within the study, it is intended to scrutinize the fractal value of alpine rocky habitats that are a part of the natural landscape and the relation between visual quality and preferences of people.

The fractal was first used as a term to describe irregular and fragmental patterns in the environment by Benoit Mandelbrot (1983). Fractal structures are the irregular geometric structures used to characterize the forms of many natural structures impossible to be described by using the Euclidean geometry (Tzanakou, 2000). Another important feature of fractal geometry is a mathematical parameter called fractal dimension (D). Fractal dimension is a concept quantifying descriptive features used to describe the features of an image or an event such as form, texture, number, color, repeating, similarity, randomness, regularity, and heterogeneousness; shortly it measures complexity (Herbert *et al.*, 1999). Fractal dimension is often a positive real number, not a whole number (Bell, 2004), and this number generally changes between 1 and 2 (Spehar *et al.*, 2003).

In the Fractal Analysis method, it can be studied on photos as a visual material. The "Box-counting method" is used as the most common calculation method of fractal dimension (Bovill, 1996). In order to calculate the fractal dimension of each sample area, firstly the photos need to be converted into an appropriate format. For this purpose, the following processes are performed for each photo: Original-colored photos are firstly converted into greyscale (8-bit) color adjust, afterwards the find edges process is implemented by adjusting the contrast (Adjust/Threshold, B&W: 255x255). Finally, it is converted to an appropriate format for the photo analysis (Edit/Invert). All these editing processes on photos were performed with Image J 1.42 photograph and picture editing software (Fig 2).

In this study, Benoit 1.3 (TruSoft, 2004) Fractal analysis program and box counting method were used in order to determine the fractal dimension of natural rocky habitat images. According to the box-counting method, calculation of the fractal dimension (D) can be formulated as follows (Cooper & Oskrochi, 2008):

$$N\,(d) = \frac{1}{d^D}$$

where, $N\,(d)$ refers to the number of boxes at size d containing part of the object being assessed across a two-dimensional field and box counting gives the box dimension (D_b).

Data Analysis

On the sample rocky habitat photos, whether 25 visual assessment attributes were effective or not was determined by the variance analysis; the relations between each visual attribute and visual quality scores were determined with the correlation analysis; attributes were effective in describing the composition on photos was determined with the regression analysis, and factor groups were formed according to the effectiveness of the attributes describing compositions on photos was determined with the factor analysis. SPSS 16.0 software was used for the statistical analysis.

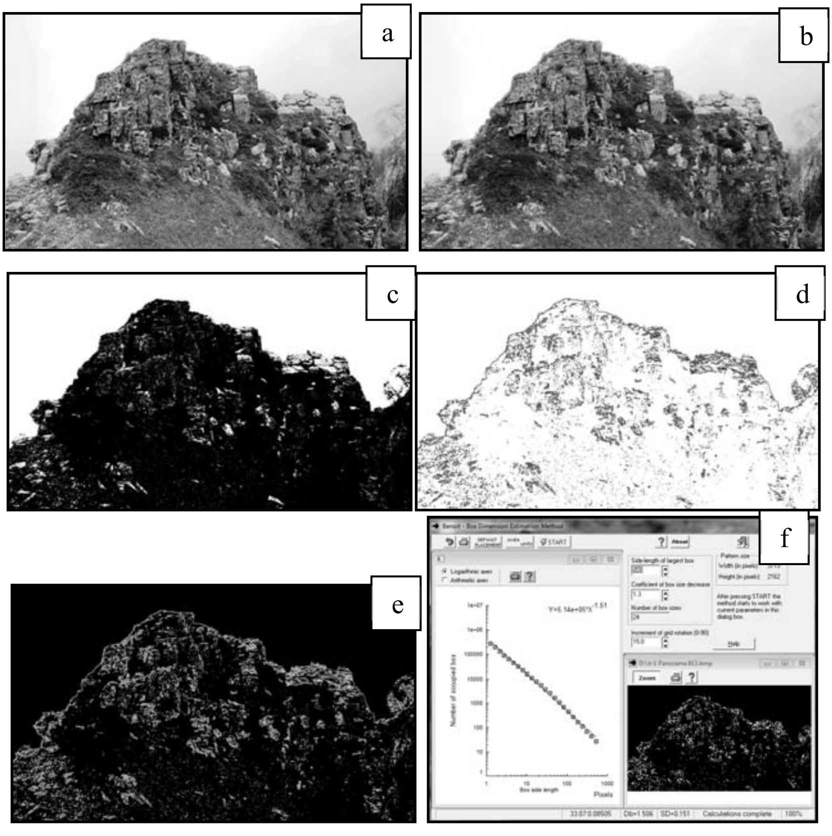

Figure 2: Editing photos and fractal dimension analysis process; a: Colored photo (3713x2162 pixel); b: Converting to greyscale photo (8 bit); c: Contrast adjustment (Adjust/Threshold, B&W: 255x255); d: Find edges; e: Edit/Invert; f: Fractal dimension analysis (Benoit 1.3. fractal analysis software application window)

RESULTS

Visual Quality Score and Fractal Dimension of Sample Rocky Habitats

The demographic characteristics of the survey participants are as follows: 55.6% of them are between the age of 20-30, and 36.2% of them are at the age of 30 and over. The participants with university degree constitute 60%, the participants in the officer occupation group constitute 48.75%, and students constitute 41.88%. In terms of the income status, 56.26% of the interviewers have the income of 1000 TL or over (Table 2).

As a result of the survey conducted, the average VQS of 50 sample rocky habitat photos were obtained. Accordingly, the first three photo number with the highest and the lowest VQS is listed as follows: 34 (VQS= 4.55), 36 (VQS=4.16), 43 (VQS= 4.15) and 47 (VQS= 2.79), 8 (VQS= 2.79) and 46 (VQS= 2.89). According to the participant groups, the change in VQS was detected to be relatively similar (Fig 3).

As a result of the fractal analysis of sample rocky habitat photos, the average fractal dimension value was determined to be high with *Db* = 1.73. The fractal dimensions of similar rocky habitats were also detected to be close to each other. It attracted attention that fractal dimension value decreased in the photos in which rocky surface was perceived more, while it increased in the photos in which green pattern was perceived more. The high fractal value of natural landscape patterns, particularly rocky habitats including dynamic silhouettes, results from their rich details.

Table 2: Demographic structure of surveying

Demographic variables		Number	Percentage (%)
Gender	Male	83	51.88
	Female	77	48.13
Age (years)	15-20	13	8.13
	20-25	56	35.00
	25-30	33	20.63
	30-35	25	15.63
	35-45	26	16.25
	Over 45	7	4.38
Education	Elementary school	1	0.63
	Junior high school	1	0.63
	High school	7	4.38
	University	96	60.00
	Graduate/ postgraduate	55	34.38
Occupation	Unemployed	1	0.63
	Student	67	41.88
	Civil servant	78	48.75
	Worker	6	3.75
	Retired	3	1.88
	Self-employed	2	1.25
	The other	3	1.88
Income* (TL)	None	60	37.50
	500-1000	10	6.25
	1000-2000	23	14.38
	2000-3000	43	26.88
	More than 3000	24	15.00
Participant group	Landscape Architect	32	20.00
	Landscape Architecture Department students	36	22.50
	The Others	92	57.50

*1 TL= 0.302 EUR= 0.343USD (The cross exchange rate is based on the date 06. 06. 2016).

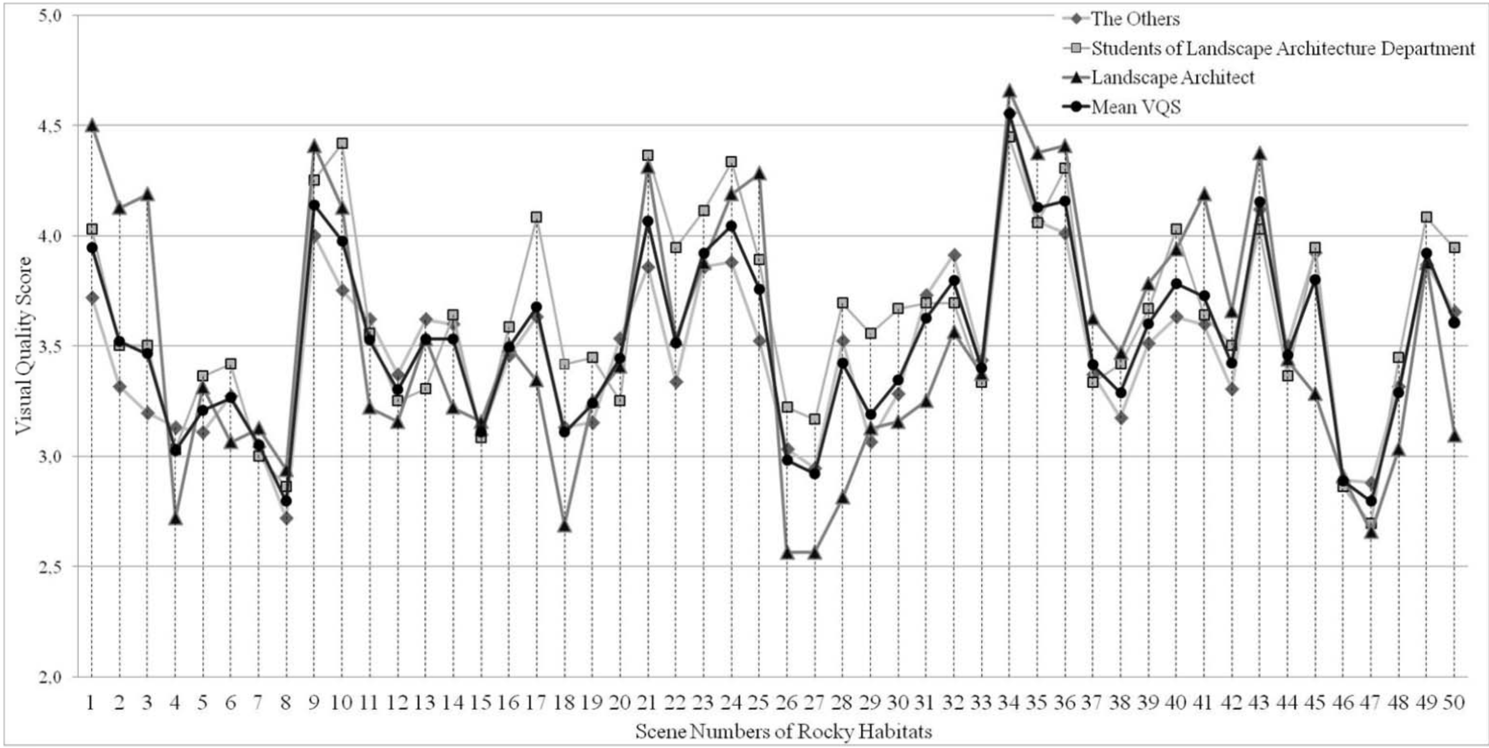

Figure 3: Distribution of the visual quality score of 50 rocky habitat photos by the participant groups

Within the visual assessment, the scatter diagram was made for the scores of each photo in order to determine whether VQS and fractal dimension values of photos were relevant or not (Fig 4). Accordingly, the sample area photos with high VQS were also observed to have relatively high fractal dimension values.

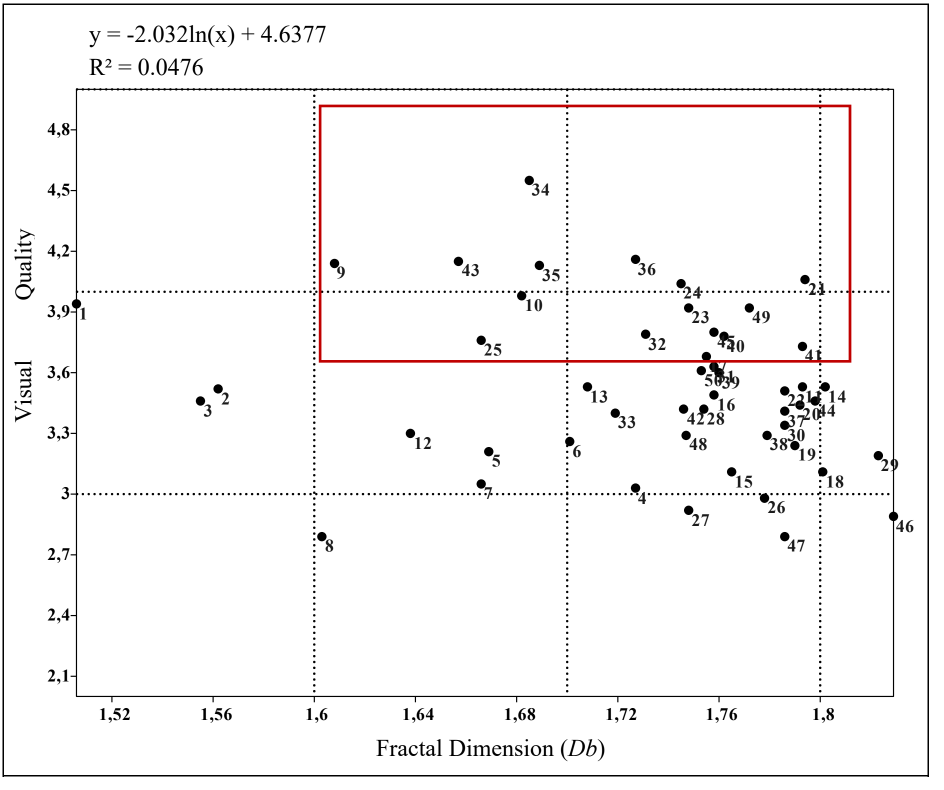

Figure 4: Distribution graph of 50 rocky habitat photos according to Fractal Dimension (*Db*) value and Visual Quality Score

Visual Preference and Assessments

At the second stage of the visual preference and assessment study, 25 attributes were examined for 16 photos identified as a result of the hierarchical cluster analysis (sample area/ photo no: 34, 9, 43, 35, 36, 10, 24, 21, 23, 49, 1, 32, 45, 40, 25 and 41) (Fig. 5, Fig. 6).

According to the results of the variance analysis, most of the visual assessment attributes were observed to have a significant effect (p=0,000) on photos. Among the attributes, "familiarity" and "wildness" were determined to be ineffective on photos with the significance level of p=0,225 and p=0.492, respectively (Table 3).

According to the correlation analysis examining the relations between VQS and visual assessment attributes of the photos, while the attributes of "diversity, coherence, color, form, texture, impressive, beautiful, unique, inviting, pleasant, exciting, relaxing, interesting, attractive, topography, silhouette and worth preserving" were meaningful and positively related with VQS at the $p< 0.01$ significance level; "complexity" (at $p<0.05$ significance level) and "familiarity" (at $p< 0.01$ significance level) attributes were meaningful and negatively related. VQS did not show a meaningful relation with the attributes of "unity, dynamism, mystery, safe, wildness and vegetation" (Table 4).

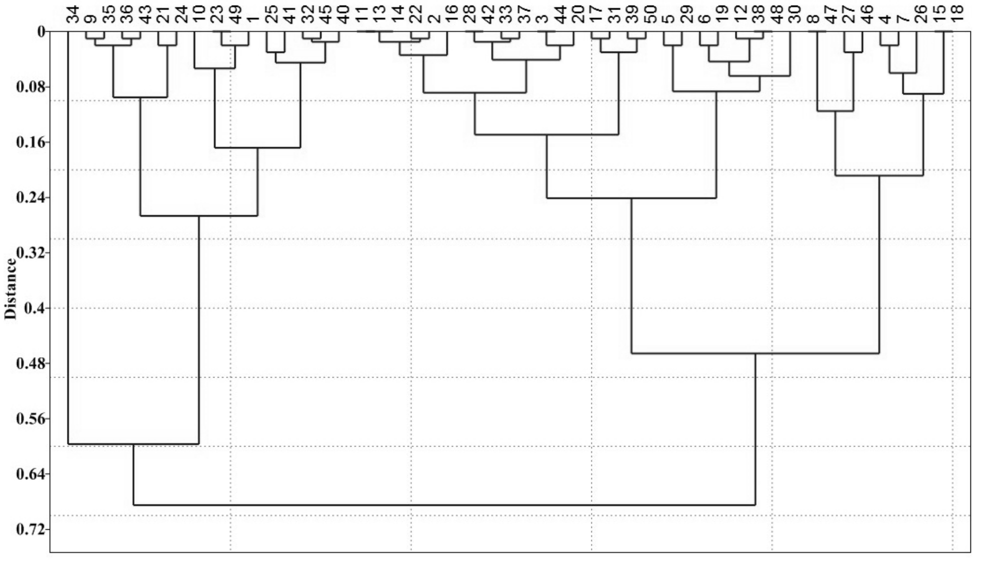

Figure 5: Hierarchical clustering dendrogram of 50 photos according to mean scores of visual quality

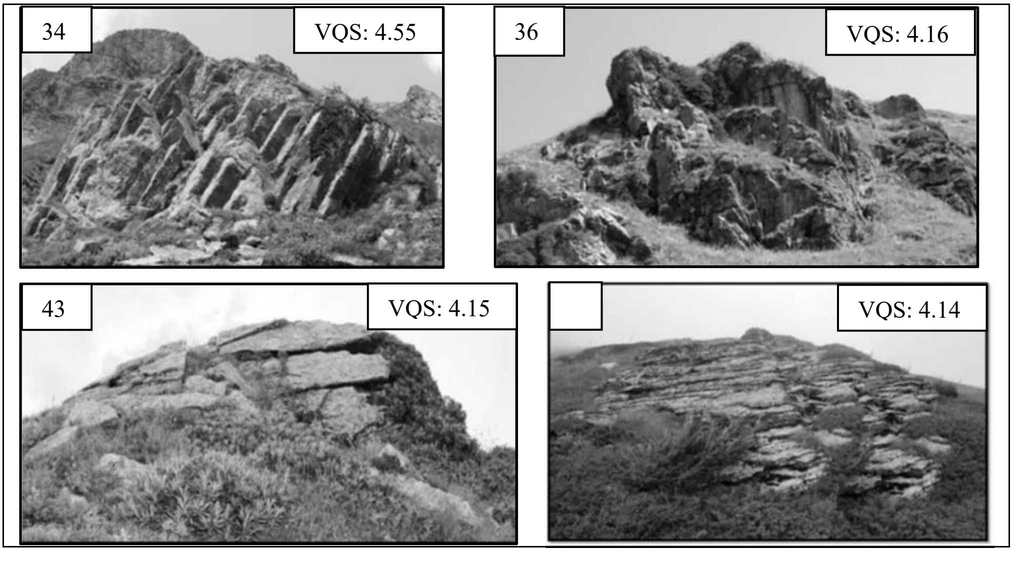

Figure 6: 16 photos with the highest visual quality score used for surveying

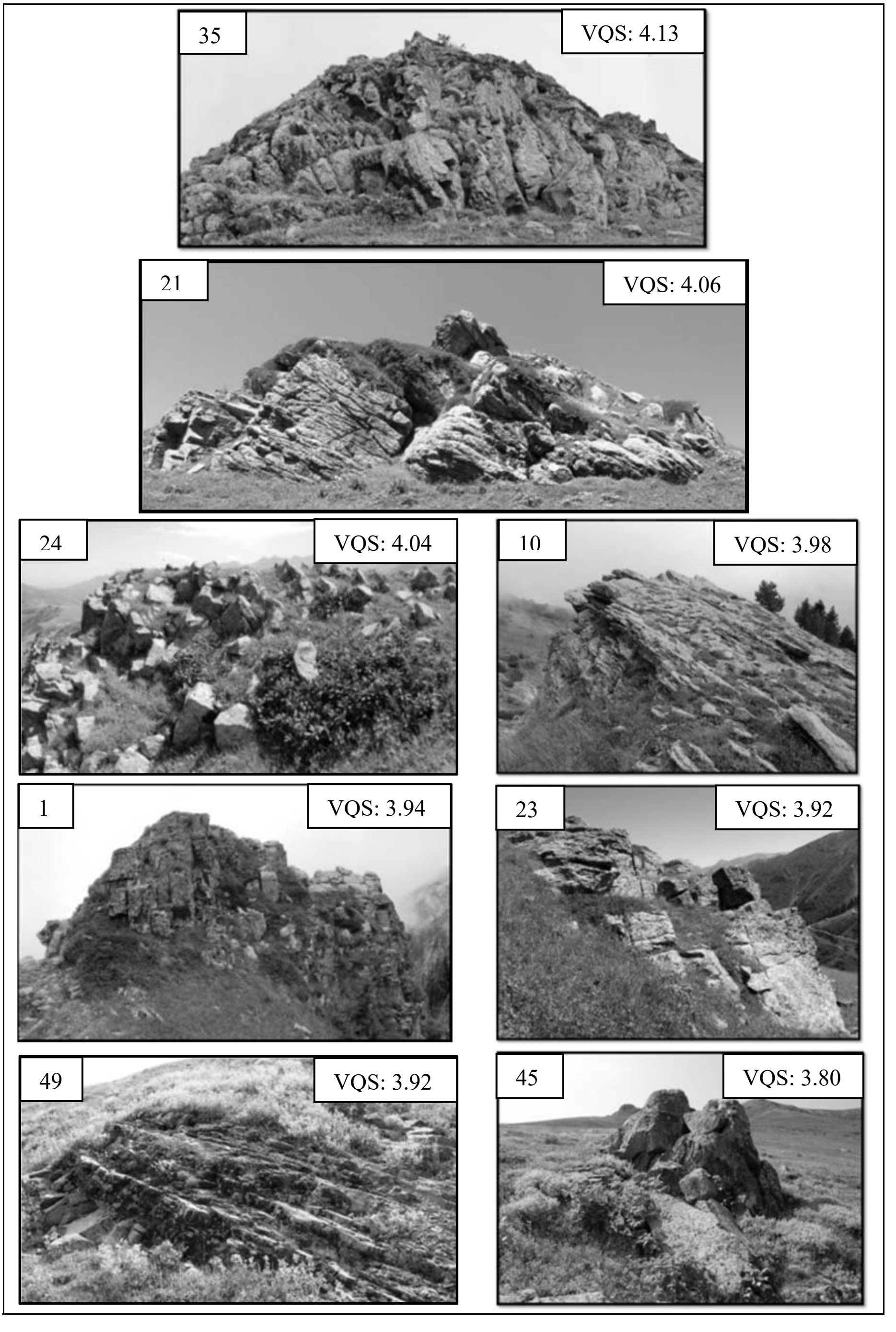

Figure 6: (Continued).

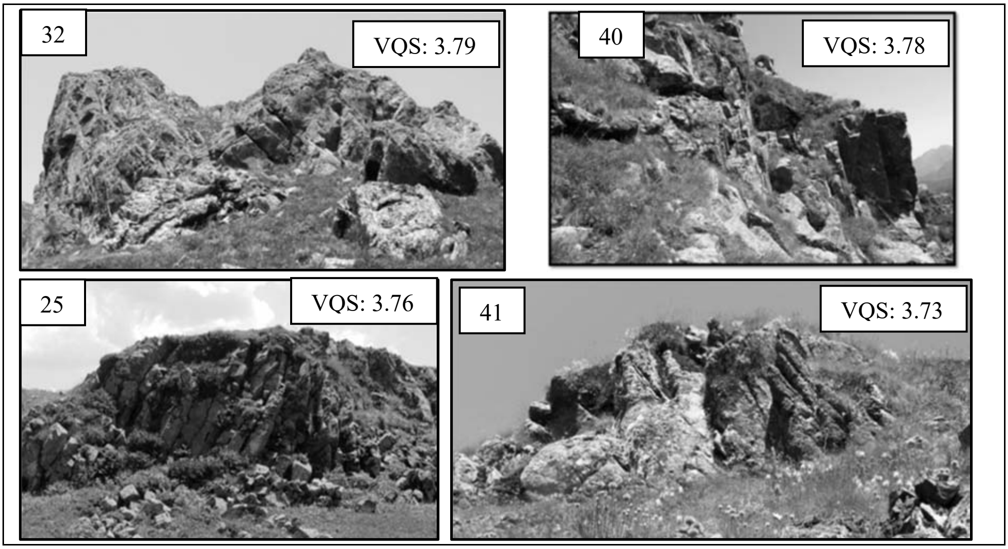

Figure 6: (Continued).

Table 3: Variance analysis of the visual attributes of the 16 rocky habitat photos ($p < 0.05$)

Visual Attributes	Mean	F	Significance
Diversity	6.808	6.797	0.000
Complexity	4.610	3.598	0.000
Coherence	2.853	3.317	0.000
Unity	1.519	1.701	0.048
Dynamic	3.551	3.481	0.000
Mystery	5.146	4.075	0.000
Color	6.928	6.536	0.000
Form	2.015	2.432	0.002
Texture	2.213	2.742	0.000
Impressive	3.711	3.656	0.000
Beautiful	2.480	3.042	0.000
Unique	5.563	4.407	0.000
Familiar	1.800	1.258	0.225
Inviting	3.522	3.658	0.000
Pleasant	3.577	4.192	0.000
Safety	6.502	5.758	0.000
Exciting	3.847	3.432	0.000
Relaxing	5.247	4.962	0.000
Interesting	4.151	3.500	0.000
Attractive	4.318	4.468	0.000
Wildness	0.813	0.964	0.492
Topography	2.466	2.631	0.001
Vegetation	6.801	6.419	0.000
Silhouette	3.373	3.385	0.000
Worth preserving	2.355	2.009	0.013

Table 4: Correlation analysis of the visual landscape attributes and visual quality score for the 16 rocky habitats photos.

Visual Attributes	VQS	Diversity	Complexity	Coherence	Unity	Dynamic	Mystery	Color	Form	Texture	Impressive	Beautiful	Unique
Diversity	,134**												
Complexity	-,096*	,076											
Coherence	,121**	,241**	-,402**										
Unity	,066	,203**	-,275**	,751**									
Dynamic	,047	,320**	,089	,182**	,263**								
Mystery	,040	,222**	,106*	,203**	,261**	,450**							
Color	,129**	,455**	-,080	,337**	,316**	,271**	,234**						
Form	,187**	,372**	-,167**	,441**	,410**	,381**	,357**	,415**					
Texture	,198**	,367**	-,198**	,465**	,415**	,287**	,279**	,432**	,696**				
Impressive	,216**	,368**	-,255**	,506**	,506**	,330**	,369**	,418**	,643**	,601**			
Beautiful	,177**	,370**	-,301**	,552**	,564**	,266**	,301**	,425**	,607**	,598**	,743**		
Unique	,242**	,301**	-,160**	,393**	,389**	,300**	,316**	,284**	,509**	,459**	,631**	,553**	
Familiar	-,147**	-,130**	,031	-,143**	-,148**	-,088	-,100*	-,097*	-,158**	-,091*	-,273**	-,230**	-,466**
Inviting	,138**	,383**	-,244**	,487**	,457**	,361**	,381**	,393**	,568**	,555**	,656**	,675**	,585**
Pleasant	,207**	,361**	-,316**	,472**	,480**	,255**	,309**	,338**	,539**	,530**	,699**	,672**	,496**
Safety	,060	,150**	-,308**	,257**	,245**	-,041	-,089	,215**	,168**	,214**	,214**	,267**	,197**
Exciting	,139**	,343**	-,112*	,357**	,380**	,482**	,448**	,346**	,515**	,463**	,621**	,565**	,525**
Relaxing	,131**	,275**	-,256**	,486**	,441**	,099*	,156**	,334**	,428**	,389**	,463**	,524**	,382**
Interesting	,160**	,359**	-,143**	,331**	,347**	,408**	,413**	,303**	,516**	,461**	,635**	,573**	,653**
Attractive	,233**	,336**	-,293**	,490**	,458**	,321**	,346**	,321**	,589**	,535**	,741**	,707**	,608**
Wild	,030	,204**	,137**	,073	,085	,151**	,151**	,116*	,090*	,049	,056	,066	,041
Topography	,141**	,302**	-,203**	,426**	,431**	,458**	,418**	,331**	,523**	,487**	,573**	,475**	,435**
Vegetation	,085	,385**	-,058	,261**	,290**	,138**	,182**	,444**	,280**	,344**	,384**	,415**	,352**
Silhouette	,141**	,302**	-,146**	,380**	,414**	,365**	,410**	,320**	,495**	,456**	,543**	,524**	,436**
Worth preserving	,156**	,407**	-,120**	,466**	,480**	,351**	,359**	,419**	,500**	,497**	,619**	,589**	,575**

Table 4: Continued

Visual Attributes	Familiar	Inviting	Pleasant	Safety	Exciting	Relaxing	Interesting	Attractive	Wild	Topography	Vegetation	Silhouette
Inviting	-,200**											
Pleasant	-,144**	,739**										
Safety	,168**	,344**	,400**									
Exciting	-,199**	,631**	,564**	,130**								
Relaxing	-,005	,515**	,573**	,532**	,378**							
Interesting	-,274**	,611**	,587**	,183**	,733**	,467**						
Attractive	-,266**	,744**	,714**	,289**	,650**	,543**	,684**					
Wild	-,011	,081	,082	-,140**	,164**	-,007	,167**	,067				
Topography	-,187**	,508**	,534**	,136**	,583**	,346**	,531**	,547**	,185**			
Vegetation	-,211**	,434**	,359**	,156**	,310**	,297**	,314**	,373**	,071	,330**		
Silhouette	-,160**	,464**	,462**	,098*	,478**	,304**	,458**	,517**	,072	,605**	,365**	
Worth preserving	-,263**	,593**	,623**	,225**	,618**	,493**	,608**	,587**	,214**	,605**	,425**	,567**

* Correlation is significant at the 0,05 level (two-tailed)
** Correlation is significant at the 0,01 level (two-tailed)

According to the correlation analysis of the attributes, the "diversity" attribute is positive and meaningful at the $p<0.01$ significance level with all attributes except the "complexity" attribute and is negatively and meaningfully related to the "familiarity" attribute. On the other hand, the "complexity" attribute is negatively and meaningfully related with "coherence, unity, form, texture, effective, beautiful, original, inviting, pleasant, safe, relaxing, interesting, field form, silhouette and worthiness for protection" attributes at the $p< 0.01$ significance level; is negatively and meaningfully related with the "exciting" parameter at the $p< 0.05$ significance level and is positively and meaningfully related to the "mystery" and "wildness" attributes at the $p< 0.05$ significance level. The "wildness" attribute is positively and meaningfully related with "diversity, complexity, dynamism, mystery, color, form, exciting and interesting" attributes and is negatively and meaningfully related to the "safety" attribute. There is a negative and meaningful relation between the "familiarity" attribute and VQS.

Consequently, the visual quality of unfamiliar rocky habitat photos was found to be high. Similarly, the "familiarity" attribute is shows a negative and meaningful relation with the "diversity, coherence, unity, mystery, color, form, texture, effective, beautiful, original, inviting, pleasant, exciting, interesting, attractive, topography, vegetation, silhouette, worth preserving" attributes, and a positive and meaningful relation with the "safety" attribute.

According to the regression analysis performed to determine visual attributes effective in describing the compositions on rocky habitat photos, it is observed that five main models are formed and the model no: 5 among them is the most effective one. Here, the most effective describing attributes were determined as impressiveness ($\beta= 0.205$), diversity ($\beta= 0,118$), safety ($\beta= -0.112$), texture ($\beta= 0.145$) and silhouette ($\beta= -0.134$); pursuant to $R^2= 0.089$, $B=3.815$, $F= 10.366$ and $p= 0.000$ (Table 5).

According to the factor analysis related to the attributes describing the compositions on the photos, five main factor groups were formed (Table 6). Accordingly, “interesting, attractive, inviting, exciting, pleasant, effective, unique, beautiful, worth preserving, form, topography, relaxing, texture and silhouette” attributes in the first group were gathered under the title of "perceptual and physical features"; coherence, unity and complexity attributes in the second group were gathered under the title of "spatial effect"; color, diversity and vegetation attributes in the third group were gathered under the title of "visual richness"; dynamism, mystery and wildness attributes in the fourth group were gathered under the title of "perceptive and spatial feature" and, familiar and safety attributes in the fifth group were gathered under the title of "psychologic effect".

As a result of the analyses performed, the relations of these five descriptive attributes with other attributes can be summarized as follows;

- The photos with the "diversity, coherence, unity, dynamism, mystery, color, form and texture" effect were found **"effective"**;
- there is a meaningful relation between all attributes except the "complexity" attribute and **"diversity"**;
- there is a meaningful relation between "diversity, complexity, coherence, unity, color, form, texture, effective, beautiful, unique, familiar, inviting, pleasant, exciting" attributes and the **"safety"** attribute.
- there is a meaningful relation between "diversity, complexity, coherence, unity, dynamism, mystery, color, form" attributes and the **"texture"** attribute;

• there is a meaningful relation between all attributes, except the "wildness" attribute, and the **"silhouette"** attribute.

Table 5: Regression analysis of the descriptive attributes of the landscape visual assessment ($p < 0,05$).

Model	Attributes	R^2	B	Beta (β)	*t*	F	Significance
1	Invariant	0,055	3,857		66,607	28,853	0,000
	Impressive		0,079	0,239	5,372		
2	Invariant	0,065	3,770		55,978	17,633	0,000
	Impressive		0,065	0,195	4,111		
	Diversity		0,038	0,117	2,471		
3	Invariant	0,072	3,828		52,919	13,383	0,000
	Impressive		0,071	0,213	4,436		
	Diversity		0,040	0,125	2,641		
	Safety		-0,030	-0,097	-2,149		
4	Invariant	0,079	3,761		47,729	11,238	0,000
	Impressive		0,050	0,151	2,677		
	Diversity		0,034	0,106	2,202		
	Safety		-0,033	-0,106	-2,351		
	Texture		0,045	0,119	2,123		
5	Invariant	**0,089**	**3,815**		46,977	**10,366**	**0,000**
	Impressive		0,068	0,205	3,421		
	Diversity		0,038	0,118	2,454		
	Safety		-0,034	-0,112	-2,489		
	Texture		0,055	0,145	2,546		
	Silhouette		-0,045	-0,134	-2,524		

Landscape Composition Assessment

Landscape composition assessment was performed for 16 sample rocky habitat photos subjected to the visual preference and assessment survey study. According to this, the landscape composition assessment table of natural rocky habitats was created to assess the structural, aesthetic and perceptual features of sample rocky habitats together (Table 7). Some of the assessment attributes in the table (pattern shape, formation, relief effect, etc.) were developed with reference to Dubé (1997) who assessed natural landscape patterns. Aesthetic and perceptual features in the table consist of the attributes with the participation score of 3.5 and above for each photo obtained as a result of the visual assessment survey. The features with the participation score below 3 are in the table as ineffective attributes. The main titles of the visual assessment are listed as follows: Physical Characteristics: pattern shape (outcrop, scree), formation (vertical mass, adjacent block, mass surface, fragmental-fissured), natural perspective appearance/topographic effect (steep, sloping), the area covered by vegetation (little, middle, much), the area covered by rock surface (little, middle, much).

Aesthetic Attributes: descriptive attributes such as color, texture, measure, line, form, coherence and unity.

Perceptual Attributes: emotional reactions (relaxing, interesting, complex, safe, exciting, pleasant, attractive, mysterious, etc.)

According to the landscape composition assessment of sample rocky habitats, the findings obtained are summarized below;

- Vertical outcrops were attributed with high visual quality.
- Uneven curved rocky lands and the balance of vegetation-rock presence make the composition more effective.
- Generally, there is no complexity effect on the photos.
- The effectiveness of aesthetic features such as form, texture, color, coherence, unity, and diversity was found to be important for preferring the composition.
- Compositions with asymmetrical form and silhouette were found to be more unique, pleasant and attractive.
- Vertical and high mass-shaped rocky habitats were observed to decrease the safety effect but increase dynamism perception. On the other hand, less curved scree type, mass rock formations and relatively small rock formations increase the inviting perception.

Table 6: Factor analysis of the attributes on landscape visual assessment*

Main factors	Attributes	Factor loadings				
		1	**2**	**3**	**4**	**5**
Perceptual and Physical	Interesting	**0,828**	0,029	0,125	0,171	-0,095
	Attractive	**0,819**	0,271	0,146	0,011	-0,054
	Inviting	**0,765**	0,238	0,267	0,037	0,041
	Exciting	**0,762**	0,087	0,111	0,321	-0,025
	Pleasant	**0,747**	0,305	0,217	-0,035	0,132
	Impressive	**0,735**	0,346	0,224	0,097	-0,124
	Unique	**0,714**	0,147	0,179	-0,017	-0,376
	Beautiful	**0,649**	0,439	0,297	0,017	-0,063
	Worth preserving	**0,622**	0,267	0,356	0,213	-0,086
	Form, Form	**0,593**	0,314	0,241	0,240	0,029
	Topography	**0,557**	0,347	0,118	0,411	-0,019
	Relaxing	**0,554**	0,308	0,287	-0,226	0,327
	Texture	**0,511**	0,367	0,326	0,156	0,071
	Silhouette	**0,495**	0,339	0,166	0,351	-0,079
Spatial Effect	Coherence	0,276	**0,825**	0,189	0,059	-0,008
	Unity	0,279	**0,776**	0,174	0,152	-0,023
	Complexity	-0,214	**-0,601**	0,183	0,368	-0,064
Visual Richness	Color	0,208	0,217	**0,709**	0,153	0,071
	Diversity	0,285	-0,050	**0,708**	0,207	0,039
	Vegetation	0,265	0,126	**0,684**	-0,029	-0,193
Perceptive and Spatial	Dynamic	0,402	0,003	0,053	**0,641**	0,051
	Mystery	0,431	0,032	-0,005	**0,606**	-0,009
	Wildness	-0,065	0,029	0,255	**0,499**	-0,001
Psychologic Effect	Familiar	-0,261	-0,043	-0,114	0,086	**0,852**
	Safety	0,359	0,163	0,219	-0,475	**0,533**
	% Variance	29,423	11,762	9,810	8,418	5,517

* Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization. All factors loading > 0,50 are showing as bold letters.

Table 7a: Landscape composition assessment for16 photos.

Physical Characteristics		Photo Number of Sample Rocky Habitats					
		1	9	10	21	23	24
Pattern shape	Outcrop	*	*	*	*	*	
	Scree						*
Formation	Vertical mass	*		*	*		
	Adjacent block					*	
	Mass surface		*				
	Fragmental-fissured						*
Topographic effect	Steep	*		*	*		
	Sloping		*			*	*
The area covered by vegetation	Much (%75)						*
	Middle (%50)	*	*			*	
	Little (%25)			*	*		
The area covered by rock surface	Much (%75)			*	*		
	Middle (%50)	*	*			*	
	Little (%25)						*
Aesthetic Attributes		Coherence Unity Form Texture	Coherence Unity Form Texture	Coherence Unity Form Texture	Diversity Coherence Unity Form Texture	Coherence Unity Form Texture	Diversity Unity Form Texture Coherence
Perceptual Attributes		Beautiful Impressive Wild	Beautiful Impressive Pleasant Relaxing Wild	Dynamic Mystery Impressive Beautiful Wild Unique Pleasant Exciting Interesting Attractive	Dynamic Impressive Beautiful Pleasant Attractive Wild Exciting Inviting Unique Mystery	Dynamic Beautiful Pleasant Attractive Mystery Impressive Inviting Exciting	Dynamic Beautiful Wild Attractive Inviting Impressive
Ineffective Perceptual Attributes		Complexity Safety	Complexity Mystery Interesting	Complexity Safety Relaxing	Complexity	Complexity	Familiar

Table 7b: Landscape composition assessment for16 photos.

Physical Characteristics		Scene Numbers of Rocky Habitats				
		25	32	34	35	36
Pattern shape	Outcrop	*	*	*	*	*
	Scree					
Formation	Vertical mass	*	*	*	*	
	Adjacent block					
	Mass surface					*
	Fragmental-fissured					
Topographic effect	Steep	*		*	*	*
	Sloping		*			
The area covered by vegetation	Much (%75)					
	Middle (%50)			*	*	*
	Little (%25)	*	*			
The area covered by rock surface	Much (%75)	*	*			
	Middle (%50)			*	*	*
	Little (%25)					
Aesthetic Attributes		Diversity Coherence Unity Form Texture	Diversity Coherence Unity Form Texture	Diversity Coherence Unity Form Texture Color	Diversity Coherence Unity Form Texture Color	Diversity Coherence Unity Form Texture Color
Perceptual Attributes		Dynamic Impressive Beautiful Wild Exciting Inviting	Wild Mystery Beautiful	Dynamic Impressive Beautiful Unique Inviting Pleasant Exciting Interesting Attractive Wild Mystery	Dynamic Impressive Beautiful Wild Pleasant Inviting Mystery	Dynamic Impressive Beautiful Unique Inviting Pleasant Attractive Wild Exciting Interesting
Ineffective Perceptual Attributes		Complexity Safety Relaxing	Complexity Relaxing Interesting	Complexity Familiar	Complexity	Familiar

Table 7c: Landscape composition assessment for16 photos.

Physical Characteristics		Scene Numbers of Rocky Habitats				
		40	41	43	45	49
Pattern shape	Outcrop		*	*	*	*
	Scree	*				
Formation	Vertical mass		*	*		
	Adjacent block				*	
	Mass surface					*
	Fragmental-fissured	*				
Topographic effect	Steep					
	Sloping	*	*	*	*	*
The area covered by vegetation	Much (%75)	*		*		
	Middle (%50)		*		*	*
	Little (%25)					
The area covered by rock surface	Much (%75)					
	Middle (%50)		*		*	*
	Little (%25)	*		*		
Aesthetic Attributes		Diversity Complexity Unity Form Texture	Diversity Coherence Unity Form Texture Color	Diversity Coherence Unity Form Texture Color	Diversity Coherence Unity Texture	Diversity Coherence Unity Form Texture Color
Perceptual Attributes		Dynamic Mystery Beautiful Exciting Wild Impressive	Dynamic Impressive Beautiful Inviting Pleasant Wild Exciting Interesting	Impressive Beautiful Unique Inviting Pleasant Safety Exciting Relaxing Interesting Attractive Wild Dynamic Mystery	Dynamic Beautiful Wild	Impressive Beautiful Unique Inviting Pleasant Safety Attractive Wild Relaxing
Ineffective Perceptual Attributes		Safety Relaxing		Complexity Familiar	Complexity	Complexity

DISCUSSION AND CONLUSIONS

The visual assessment technique in landscape architecture involves determining attributes that are not only apparent such as diversity and worthiness of protection but also subjective ones describing the feelings such as natural, familiar, relaxing, regular, structured, well-protected, fertile and boring when determining the most effective factors on visual beauty.(Matthies *et al*., 2010). Within this concept, as Lothian (1999), Daniel (2001), Panagopoulos, (2009), Skrivanova & Kalivoda, (2010) stated, expert and perception-based approaches and the main attributes of landscape aesthetics (form, line, color, texture and their combination) were used at the visual assessment stage.

On the other hand, for calculating the fractal dimension of natural landscapes photographs were used in many visual landscape assessment studies and a statistically meaningful relation was detected between the fractal dimension and the preferences of people (Taylor *et al*., 1999; Stamps, 2002; Cheung & Wells, 2004; Hagerhall *et al*., 2004; Cooper & Oskrochi, 2008; Cooper *et al*., 2010; Pihel, 2011). The studies on fractal patterns and perceiving landscape silhouettes have shown that the fractal dimension of the most natural and preferred landscape patterns is at the middle level (Taylor, 2006; Ode *et al.*, 2010). In this study, the fractal dimension values of sample rocky habitat photos were determined between 1.60 < D_b < 1.80, and the visual quality values were determined between 3.70 < VQS < 4.70. In this way, a positive relation was observed between VQS and fractal dimension values. Consequently, using not only subjective but also objective assessments can be useful for determining the characteristics of a natural landscape pattern on the photo.

As a result of this study, it has been determined that 25 attributes used in the visual assessment of rocky habitats to form five main factor groups (perceptive and physical features, spatial effect, visual richness, perceptive-spatial feature, psychologic effect) and impressiveness, diversity, safety, texture and silhouette attributes are effective descriptive attributes. It has also been claimed in other studies that these attributes are effective particularly in describing the landscapes with natural landscape characteristics (Özbilen, 1983; Sheppard, 2004; Acar & Sakıcı, 2008; Sevenant & Antrop, 2009; Matthies *et al*., 2010).

Consequently, it can be stated that impressive visual beauty, diversity and strong texture-silhouette influence which creates positive or negative security feeling are very effective parameters in describing of rocky habitat landscapes. In the visual assessment of the composition consisting of vegetation - rock communities in natural rocky habitats, while color, texture, shape-form, silhouette, field form and vegetation are effective in the physical perception of composition; interesting, attractive, inviting, exciting, pleasant, effective, original, beautiful, worth preserving, relaxing, diversified, dynamic, mysterious, wild, familiar and safe are effective in the psychological (affective) perception of composition. Apart from that, spatial coherence and unity among the elements composing rocky habitat (such as rock, vegetation and field form) and a low complexity effect are positively effective in the visual assessment.

In conclusion, it is observed that according to findings of the current study, the alpine rocky habitats have definite visual quality value. Therefore, opportunities should be created for people to use these habitats by considering the protection-usage balance. Accordingly, the landscape values of other landscape patterns such as alpine rocky habitats should be examined and databases created for these habitats should be used in landscape planning studies.

This study addressing the objective and subjective assessment approaches together is considered to be a reference as an approach for the visual landscape assessments of other natural landscapes such as forests, coasts, lakes, and valleys with visual value like rocky habitats.

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Chapter 3

Assessment of Children's Playgrounds in Terms of Design Approach, Physical Characteristics and User's Ideas

Habibe ACAR*

1. INTRODUCTION

Studies on children and their environment have shown that playing in the open areas have some positive effects on their healthy development (Wilson, 2004; Acar, 2009). Many studies have shown that of these spaces and especially the natural areas or areas with natural elements contribute to the psychological, cognitive, emotional, physical, social and motor development of children; increase their sensitivity to the environment; help the treatment of the hyperactivity of children; help their learning and develop their imagination and creativity; contribute to their thinking and observation and to play quality (Acar, 2009). In addition, research confirms that "greening playgrounds can reduce bullying and crime; nurture teamwork and improve self-esteem; provide opportunities for kinesthetic learners and vocational learning and support all areas of the curriculum" (Day & Midbjer, 2007). However, especially in the city centers where there is no or limited access to such environments, public parks or play areas that are designed separately in public parks are extremely important to meet children's play needs in open spaces.

Play has been dealt with different aspects by different people. According to them, the play is defined as a spontaneous activity that is child initiated and terminated; is the way children learn and is an essential part of their growth and development (Jones, 1997). Play is not a cognitive condition, but is a behavior or action and causes the child to make effort about what to do; and the play is necessary for the development of intelligence (Piaget & Inhelder, 1971). According to Moore (1990, cited in Loebach, 2004) "play lies at the heart of childhood, limited in its boundaries only by the opportunities afforded by physical settings and by the attitudes and commitment of those whose business it is to manage them".

Theemes (1999), listed the basic elements of outdoor play under 5 headings. Play is pleasurable and gratifying; self-directed and engaged in freely; intrinsically rewarding for children; challenging, active and engaging; imaginative.

1.1. The importance of open spaces for children

Childhood has changed from one that was child-centered to one that is over-controlled and over-structured by adults (Francis & Lorenzo, 2008). This causes the children to use closed spaces rather than open spaces and to play in virtual environments.

However, open spaces offer different opportunities to children that are absent in closed spaces and enable them to play freely in interaction with the environment (White

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& Stoecklin, 2005). Children's behaviors during the play refer to the activity. The definition of the activity in the play refers to the use of the whole body in playing and learning. Learning by doing and learning during the play refer to the activity during the learning process. Activity is related to creativity. Physical activity also supports cognition because learning and cognitive development enrich children's ability to express themselves when playing together and cause them to be more natural, more exuberant and more imaginative (Hyvönen & Juujärvi, 2004). For this reason, physical activity is extremely important for healthy development of children,both physically and psychologically (Oliver *et al.*, 2011; Veitch, Salmon & Ball, 2007; Bundy *et al.*, 2011). Open spaces are suitable for physical activities. However, that children have limited play opportunities in open spaces and that they commute to and from schools in school buses for safety or distance concerns have reduced children's physical activities.

The time that children spend in playgrounds near their homes are related to their physical activity levels. Recent research has shown that there is a positive correlation between easy access to local parks and playgrounds and children's physical activities. However, safety concerns, careful parental practices, addiction to vehicles and vehicle-based urban design gradually caused children to lead a life in which they are more sedentary, under more parental supervision while outside, and in which they have to move from one activity to another. Additionally, because parents prefer to take their children to schools in their private cars, there are less children and more cars in the streets and this creates a social trap that increases the risks for pedestrians, cyclists, children and others. Furthermore, the absence of children in public spaces decreases the social harmony and sense of space of others (Oliver *et al.*, 2011). What is more, the decrease in such activities brings with it the problem of obesity (Özdemir & Yılmaz, 2008). Viewed from this perspective, it can be said that in today's conditions in which children's autonomous movement has been restricted, open spaces are extremely important in offering children the opportunity to play, to be with other children and to improve their creativity and imagination. It is clear that neighborhood parks have the potential to increase the leisure time physical activities of both children and adults because of the fact that they are near their homes and they offer different recreational alternatives. However, there is ample evidence that many children in the 10-13 age group do not use neighborhood parks and playgrounds. An article in the New York Times attributed this to the fact that such parks lack imagination and that they are standardized (Sideris & Sideris, 2010).

Playing in an open space enables children to have contact with the nature, offers them opportunities for social play, freedom of movement and active physical play (Theemes, 1999); helps them prepare for life, gives them the chance to observe and explore; contributes to their motor development; and creates opportunities for louder plays (Acar, 2009). Contrary to this,"children unable to experience autonomous contact with their peers, with their elders, with nature, with their neighbourhood and city are too often troubled children. As a result, they too often grow into troubled adults" (Francis & Lorenzo, 2008).

1.2. Playground design

The environments that offer children the opportunity to play may be designed or undesigned. The open space playgrounds that are designed for children, which is the main focus of the present study, and how to design them. The design of such areas are extremely importnt because “environment affects behavior” (Proshansky, Ittelson, Rivlin, 1976). As Jones & Prescott (1978) state, “the type, quality and diversity of the physical setting we create for children directly affect the type, quality and diversity of the child’s play” (cited in Jones, 1997). Similarly, Woolley and Lowe (2013) investigated the relationships between the design approach to open space playgrounds and play value and indicated the effects of the environment on the play.

First of all, playgrounds that offer children the opportunity to play in open spaces must be designed so as to meet the needs and demands of children. In general, the stages in the design of an open play space can be collected under the following titles (Acar, 2013):

• Site analysis and data collection

• Forming the main design decisions in accordance with the field opportunities and the needs and preferences of children

• Producing scenarios

• Selection of ideal scenarios and detailing

• Application

“In this process, the design considerations of play spaces in urban areas can be grouped under the following headings (Acar, 2013);

• The nature of the site and facilities; designed area, usage status, site facilities

• The needs of children; user profile, expectations; activities, safety, nature, plants, water, animals, topography, socialization, the use of the senses, creativity

• The materials that are to be used; safety, soundness, health, natural-artificial, free materials, design for everyone

The designers who design such spaces for children according to these criteria stated that it is important that children be incorporated into the design process. For they are the main users of these areas.

2. AIM OF THE STUDY

Whether or not the playgrounds have the afore mentioned qualities and whether or not they meet children’s needs and expectations are very important. Within this context, the study aims to sample the nearest playgrounds, present their existing conditions and offer the evaluation process of the present study as a proposal of method for further studies in other cities in Turkey. Ultimately, the starting point of this study are such questions as “What are the structural conditions of the playgrounds in Trabzon? What kind of opportunities do they offer to children? What are the ideas of the users of these playgrounds?”. Thus, the aims of the present study are as follows:

• To identify the current status of the playgrounds within the urban area of Trabzon Municipality in terms of the varieties of activity that they offer, and natural and artificial elements (equipment) they have,

• To identify the plant species, whether or not these plants are used in the plays, and whether or not they are suitable for the playgrounds in terms of children’s health,

• To elicit the ideas of children and parents, the main users of these areas, on the playgrounds,

• Accordingly, to identify the needs and problems through the eyes of children and parents,

• Under the lights of the data obtained, to suggest some solutions for the creation of more quality playgrounds that will be designed according to the needs and demands of children,

• In this way, to contribute to the city of Trabzon in its course to be a metropolitan city to have ideal open play areas for children.

3. MATERIAL

3.1. Field of work

The study was carried out in the city of Trabzon, Turkey. Trabzon has an area of 4,664 square kilometers and lies between 38° 30′ – 40° 30′ Eand 40° 30′ – 41° 30′ Non the slopes of Kalkanlı massif facing the north in the middle of the arch created by the North-eastern Black Sea Mountains. Trabzon is surrounded by the Black Sea in the north, cities of Gümüşhane and Bayburt in the south, city of Rize in the east and city of Giresun in the west (URL, 2013) (Fig. 1).

The study was carried out in the playgrounds within the urban area of Trabzon Municipality. In this area, there are 42 neighborhoods. According to the Green Area Inventory Report prepared in 2010 by the Directorate of Parks and Gardens of Trabzon Municipality, Trabzon has a total of 120 areas with the characteristics of city parks, playgrounds and children's parks within its urban area (Trabzon Municipality, Directorate of Parks and Gardens, 2010). According to the results of the address-based population census dated 31 December 2011, the total population of the Trabzon city center is 418,455. Of this population, 16,523 are in the 0-4 age group, 17,110 in the 5-9 age group, 19,144 in the 10-14 age-group and 20,630 in the 15-19 age group.

3.2. Selection of fields of work

In order to be able to evaluate the playgrounds in Trabzon, the Green Area Inventory prepared by the Directorate of Parks and Gardens of Trabzon Municipality in 2010 was taken as the basis when choosing the sample playgrounds for the present study. According to this inventory, there are 42 neighborhoods within the boundaries of the urban area of Trabzon Municipality.

3 out of 42 neighborhoods had no active green area and, therefore, they were excluded from the study. According to the afore mentioned green areas inventory, the playgrounds or parks in some of the neighborhoods do not have any play materials or play areas. Therefore, Cumhuriyet, Gazipaşa, Kurtuluş and Hızırbey neighborhoods were excluded from the evaluation. Of the playgrounds or neighborhood parks and children's parks, two with the largest area in size were chosen to represent all the neighborhoods that are studied in this study. In some neighborhoods, there was only one such area and therefore only one area was chosen from each of these neighborhoods; in some neighborhoods there was no such area and therefore such neighborhoods were excluded from the study; and three parks from two neighborhoods each were evaluated. In addition, of the 54 fields of work investigated on site, 6 were not found in the area, 7 did not have any play materials, 2 were removed, and 1 was desolated. Consequently, the data obtained from 38 playgrounds in 26 neighborhoods were evaluated. Figure 1 shows the distributions of the sample playgrounds according to the neighborhoods. Table 1 shows distribution of playgrounds in terms of neighborhoods and status.

Table 1: Distribution of playgrounds in terms of neighborhoods and status

Neighborhoods	Parks/Playgrounds	Status	Neighborhoods	Park/Playground	Status
Çarşı	Ahmet Şener Neighborhood Park	N	1 Nolu Bostancı	Bostancı Sitesi Neighborhood and Children's Park	W
Çömlekçi	Denizciler Sokak Playground	W	2 Nolu Bostancı	2 Nolu Children's Park	S
	Cengiz Topel Primary Education School Playground	D		1 Nolu Children's Park	S
İskenderpaşa	Turco-Hungarian Friendship Neigh. and Children's Park-2	N	Bahçecik	1 Nolu Children's Park	W
Kemerkaya	Turco-Hungarian Friendship Park – 1	N		Sağlık Meslek Lisesi Yanı Children's Park	S
Pazarkapı	Haçkalı Hoca Baba Children's Park	W	Boztepe	Ahmet Rasim Karanis Children's Park	N
1 Nolu Beşirli	Eyüboğlu Children's Park	W		Yavuz Selim 2 Nolu Children's Park	W
	ŞelalePark	N	Kanuni	Konuk Sokak Neighborhood and Children's Park	W
2 Nolu Beşirli	2 nolu Beşirli Neighborhood Park	W	Kaymaklı	Şebnem Sitesi Yanı Neighborhood and Children's Park	W
	Şenyuvam Siteleri Children's Park	N	Soğuksu	Muhsin Yazıcıoğlu Neighborhood and Children's Park	W
1 Nolu Erdoğdu	Hasanpaşa Kışlası Playground	W		Yamaç Siteleri Children's Park	R
2 Nolu Erdoğdu	Belde Playground	W	İnönü	Tanjant Altı Playground	W
	Sağlık Ocağı Yanı Neighborhood Park and Playground	W	Kalkınma	Yüzüncüyıl Neighborhood and Children's Park	W
3 Nolu Erdoğdu	Çeşmekent Neighborhood and Playground	W		Kalkınma Children's Park	W
	Doğa Anneler Playground	W	Konaklar	Konaklar Neighborhood and Children's Park	W
Aydınlıkevler	611 Nolu Sokak Recep Yazıcıoğlu Park	W		Öğretmenevi SokakChildren's Park	W
	Tambirlik-2 Children's Park	S		İbrahim Alemdağ Children's Park	W
Değirmendere	Cevher Dudayev Neighborhood and Children's Park	W	Sanayi	Anadolu 1 Children's Park	R
	Şehit Piy. Er H.AydınNeighborhood and Children's Park	W		Anadolu 2 Children's Park	N
Esentepe	Fatih Neighborhood Park and Playground	W	Toklu	Saraybosna Neighborhood Park and Playground	S
	Çocuk Dostu Şehir Neighborhood Park and Playground	W		9 Nolu Playground	S
Fatih	Mehmet Akif Ersoy Playground	W	Üniversite	Konak Caddesi Neighborhood and Children's Park	W
	Zübeyde Hanım Playground	W	Yalı	Faroz Neighborhood Park and Playground	W
	Oyuncakistan	W		Trabzon Lisesi Arkası Neigh. Park and Playground	W
Gülbaharhatun	Atapark Neighborhood and Children's Park	W	Yenicuma	Yeni Sokak Playground	W
Yenimahalle	Coşkun Davulcuoğlu Neighborhood and Children's Park	W	Zafer	Zafer Playground	W
Yeşiltepe	Doktor Sadık Ahmet Neighborhood and Playground	W	**W**orked on 38	**S**ought but not found 6	**N**o equip./ Playground 7
	Yeşil Sokak Playground	W	**R**emoved 2	**D**esolated/Cannot be used 1	**TOTAL 54**

3.3. Procedures

During the fieldwork, the data were collected in three different categories according to the aims of the study. In their study, Woolley & Lowe (2013) also collected their data on playgrounds under three categories as play types, physical elements of a space and environmental characteristics of the space. The present study evaluated the sample playgrounds in terms of physical characteristics, identification of plant species and users' ideas. The first of these are the data that give information about the structural/physical statuses of the playgrounds. In order to get data about the statuses of playgrounds, identity cards were prepared for all playgrounds separately which show their structural statuses under four titles (activity areas, artificial elements (equipment), natural elements and floor material). The criteria that were evaluated under these titles are given in table 2.

Such information as whether or not the sample playgrounds have these criteria; if they do, the number of them; and whether they are well-kept or neglected were recorded on the ID cards for each playground. The second category that was used in data collection is the identification of plant species in the areas of work. ID cards were created for this. The plant species on each playground were recorded on these cards under the titles of trees, bushes, groundcovers, seasonal plants and lawn. Additionally, the number of plant species, whether they are well-kept or neglected, and whether they can potentially be used in plays were also ascertained.

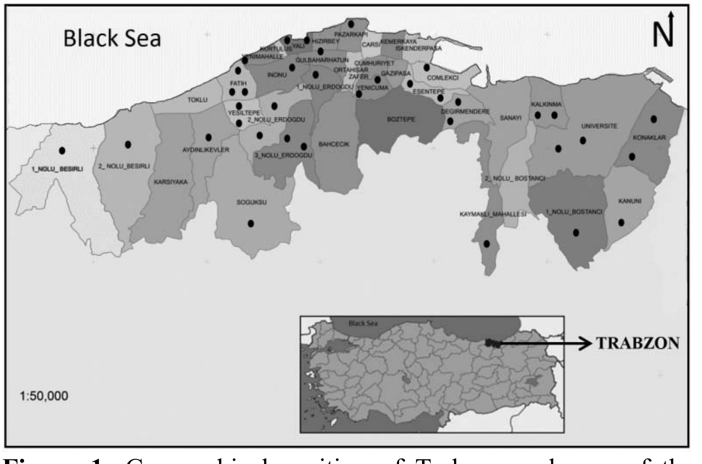

Figure 1: Geographical position of Trabzon and map of the neighborhood boundaries of the center of Trabzon

Finally, a questionnaire was administered to children and their parents to elicit their thoughts on, and demands from, the playgrounds. Two questionnaires were prepared, one for children and one for parents. The items in both quetionnaires were divided into three groups. The first group contained items that elicited demographic information from both user groups. The second part contained items that elicited information about access to, and evaluation of, the playgrounds. The last part contained items that elicited users' ideas on, and demands from, playgrounds, the aim of which was to create better playgrounds or playgrounds with more characteristics. The items were both open-ended and closed-ended. The parents'questionnaire was administered to the parents in the playgrounds. The cover letter of the parents' questionnaire briefly explained the scope and aim of the study to the parents and then the parents responded to the items in the questionnaire. For the administration of the children's questionnaire, first the informed consent of the parents was obtained from the parents. Then the children's questionnaire was administered to the children in the form of interview. The items in the questionnaire were read to the children one by one and the responses were written down by the researchers on the forms. The fieldwork of the study was carried out between June and September 2012.

Table 2: Criteria that were used to show the structural statuses of the playgrounds

Activity Areas		Artificial Elements (Materials)	
Sitting area		Swing	Exercise equipment
Sandpit		Slide	Chin-up bar
Performance area/Amphitheater		See-saw	Paint wall
Water area		Climbing	Boundary wall/Fence
Grass area		Ferris wheel	Sitting
Play equipment		Fountain	Waste basket
Skateboard/Roller skaing rink		Water element	Cover/Pergola/Summerhouse
Natural Elements		**Floor Material**	
Plant	Rock/Pebble	Rubber	Soil
Animal	Topography	Sand	Parquet

4. RESULTS

4.1. Evaluations in terms of the structural/physical conditions of the playgrounds

The physical conditions of the playgrounds were evaluated under four titles as presence of artificial elements (equipment), presence of natural elements, presence of activity areas and presence of flooring material. The numbers and the conditions of the materials under these titles were ascertained in the playgrounds. The study did not consider how much/many of each material was/were present in the playgrounds. The study only considered the presence of these materials in 38 playgrounds. The percentages are given in table 3.

Table 3: Percentage values concerning the physical evaluations of the playgrounds

Physical caharacteristics	Percent	Physical characteristics	Perce
Artificial elements (equipment):		**Natural elements:**	
Swing	100,00	Plant	97,37
Slide	97,37	Topography	18,42
Sitting	94,74	Rock/Pebble	0
Waste basket	84,21	Animals	0
See-saw	78,95	**Activity areas:**	
Boundary walls/Fence	76,32	Play equipment	100,0
Ferris wheel	34,21	Sitting area	97,37
Climber	23,68	Grass area	76,32
Exercise equipment	23,68	Performance area/ amphitheater	5,26
Fountain	10,53	Skateboard/roller skate/empty spaces	2,63
Cover/Pergola/Summerhouse	5,26	Sandpit	0
Chin-up bar	5,26	Water-related areas	0
Paint walls	2,63	**Ground:**	
Water element	0	Rubber	89,47
		Parquet/square stone	36,84
		Sand	2,63
		Soil	2,63

4.2. Evaluations of the plant species in the playgrounds

The plants in the playgrounds that this study examined were studied in terms of their species, numbers, being well-kept/neglected, and whether they can be used for play purposes. The presence percentages of the plants in the 38 playgrounds that this study examined are given in table 4 (without considering their numbers).

Table 4: The plants and the distribution of their presence in percentages

Plant species	Percent	Plant species	Percent
Trees			
Cercis siliquastrum	34,21	*Prunus domestica*	*2,63*
Cedrus libani	31,58	*Quercus robur*	*2,63*
Tilia tomentosa	31,58	*Robinia pseudoacacia*	*2,63*
Acer negundo	*26,32*	*Salix babylonica*	*2,63*
Aesculus hippocastanum	*26,32*	*Tilia argentea*	*2,63*
Platanus orientalis	*26,32*	*Tilia phylatyphyllos*	*2,63*
Fraxinus exelcior	*21,05*	**Bushes**	
Picea abies	*21,05*	*Ligustrum japonica*	*63,16*
Laurus nobilis	*18,42*	*Spirea vanhouttei*	*50,00*
Robinia pseudoacacia	*18,42*	*Cotoneaster frigida*	*28,95*
Acer pseudoplatanus	*15,79*	*Nerium oleander*	*28,95*
Cupressus arizonica	*15,79*	*Hebe veronica*	*15,79*
Magnolia grandiflora	*13,16*	*Thuja orientalis*	*15,79*
Cedrus deodora	*10,53*	*Forsythiaxintermedia*	*13,16*
Pinus brutia	*10,53*	*Wisteria chinensis*	*13,16*
Cryptomeria japonica	*7,89*	*Ligustrum japonica*	*10,53*
Eucalyptus camaldulensis	*7,89*	*Erica arborea*	*7,89*
Koulreutaria paniculata	*7,89*	*Euonymus japonica*	*7,89*
Melia azaderach	*7,89*	*Hydrangea macrophylla*	*7,89*
Phoenix dactylifera	*7,89*	*Jasminium fruticans*	*7,89*
Punica granatum	*7,89*	*Pittosporum tobira* "Nana"	*7,89*
Sequoia sempervirens	*7,89*	*Weigela coraensis*	*7,89*
Acer palmatum	*5,26*	*Berberis thunbergii*	*5,26*
Acer platanoides "Krimson King"	*5,26*	*Cahamaecyparis psifera*	*5,26*
Catalpa bignonioides	*5,26*	*Deutzia scabra*	*5,26*
Cryptomeria japonica "Elegans"	*5,26*	*Juniperus horizontalis*	*5,26*
Cupressus sempervirens	*5,26*	*Rosa sempervirens*	*5,26*
Hibiscus syriacus	*5,26*	*Viburnum orientale*	*5,26*
Laurocerasus officinalis	*5,26*	*Abelia grandiflora*	*2,63*
Malus floribunda	*5,26*	*Agave americana*	*2,63*
Picea abies "Glauca"	*5,26*	*Buxus sempervirens*	*2,63*
Picea pungens "Glauca"	*5,26*	*Cotoneaster nitida*	*2,63*
Pinus sylvestris	*5,26*	*Euonymus alata*	*2,63*
Abies nordmanniana	*2,63*	*Hedera helix* "Alba Marginata"	*2,63*
Acer platanoides	*2,63*	*Jasminium nudiflora*	*2,63*
Albizzia julibrissin	*2,63*	*Ligustrum vulgare*	*2,63*
Chamaecyparis lawsoniana	*2,63*	*Photinia fraseri*	*2,63*
Chamaecyparis psifera	*2,63*	*Pittosporum tenuifolium*	*2,63*
Cupressus macrocarpa	*2,63*	*Pyrcantha coccinea*	*2,63*
Eriabotrya japonica	*2,63*	*Rhododendron ponticum*	*2,63*
Ginkgo biloba	*2,63*	*Rosmarinus officinalis*	*2,63*
Juglands regia	*2,63*	*Thuja occidentalis*	*2,63*
Lagerstroemia indica	*2,63*	*Thuja occidentalis* "Aurea	*2,63*
Morus alba	*2,63*	*Thuja occidentalis* "Compacta"	*2,63*
Phoenix canariensis	*2,63*	*Thuja occidentalis* "Danica"	*2,63*
Pinus sylvatica	*2,63*	*Viburnum tinus*	*2,63*
Prunus avium	*2,63*	*Yucca flamentosa*	*2,63*
Prunus ceracifera "Atropurpurea"	*2,63*		

4.3. Users' Ideas

4.3.1. Children's Ideas

Table 5 shows the demographic characteristics of the children that participated in the study and table 6 shows the children's transportation to playgrounds and the time they spend there.

Table 5: Demographic profile of the participating children

Demographic profile	Frequency	Percent		Frequency	Percent
Sex:			**Class:**		
Girl	41	46,59	Not attending	13	14,77
Boy	47	53,41	1st grade	3	3,41
			2nd grade	14	15,91
Age group:			3rd grade	13	14,77
3-5	5	5,68	4th grade	7	7,95
6-8	27	30,68	5th grade	11	12,50
9-11	31	35,23	6th grade	10	11,36
12-14	24	27,27	7th grade	8	9,09
15-17	1	1,14	8th grade	8	9,09
			9th grade	1	1,14

Table 6: Children's transportation to playgrounds and the time they spend there

Transportation			Time spent		
Type of transportation:	**Frequency**	**Percent**	**Visit frequency**	**Frequency**	**Percent**
On foot	65	73,86	Every day	49	55,68
By bike	17	19,32	Once or twice a week	26	29,55
By private car	6	6,82	Once a week	8	9,09
Public transportation	0	0	Once a month	0	0
			Less than once a month	5	5,68
			Time spent:		
			Less than 1 hour	3	3,41
			1 hour	7	7,95
			1-2 hours	40	45,45
			Above 2 hours	38	43,18

Children were asked where else they used as play areas other than the playgrounds. In order to elicit the most popular parts or equipment which children prefer to play in the playgrounds, they were asked "in which part of the playground do you play most". The results are given in table 7 and table 8.

Children were asked which elements or areas they used for play purposes other than the equipment in the playgrounds, and the frequency and distribution of their responses are given in table 9.

The majority of children (81,82%) think that the playgrounds are not enough. In connection with this question, children were asked some open-ended questions to elicit "what kind of a playground they want to play in" and "how their ideal playground is". Their responses to these questions were grouped in order to be more meaningful (table 10).

Table 7: Where do children play other than in the playgrounds?

Other play spaces	Frequency	Percent
Neighborhood/Street/Garden	42	47,73
Home	34	38,64
Not playing in another open space	3	3,41
School	2	2,27
Synthetic pitch	2	2,27
Internet café	2	2,27
Another playground	1	1,14
Shopping mall	1	1,14
Amusement park	1	1,14

Table 8: Where do children play most in the playgrounds that they use?

	Frequency	Percent
Swing	53	60,23
Slide	7	7,95
In empty spaces/Skateboard	6	6,82
Ferris wheel	6	6,82
Synthetic pitch	5	5,68
On the benches/Sitting areas	4	4,55
Climber	2	2,27
Basketball court	2	2,27
Sports/Exercise equipment	1	1,14
Train	1	1,14
Everywhere	1	1,14

Table 9: What other elements or areas do children use in the playgrounds other than the playground equipment?

	Frequency	Percent
Ball	80	31,37
Bicycle	65	25,49
Lawn	52	20,39
Flowers	31	12,16
Trees	11	4,31
Bushes	11	4,31
Computer	3	1,18
Animals	1	0,39
Sandpit	1	0,39

Table 10: What kind of a playground do children want?

	Frequency	Percent
A playground with artificial elements, and structured areas	62	56,88
A playground that has a suitable size; is suitable for different age groups; is clean, different and more modern	18	16,51
A playground with water element or areas related with water	13	11,93
A playground which has natural elements and areas	10	9,17
Natural+Artificial	4	3,67
Existing playground is enough	2	1,83

4.3.2. Parents' Ideas

Table 11 shows the demographic characteristics of the parents and table 12 shows parents' transportation to playgrounds and the time they spend there.

Like children, the parents, too, stated that closeness of the playgrounds is the most important reason for preference (27,94%) (Table 13). This item in the questionnaire was about the reasons for preference for the playgrounds. It was not a ranking question. So parents were free to state as many reasons as possible. As a result, 136 responses were elicited from the parents and evaluations were made accordingly.

Table 11: Demographic profile of the participating parents

Demographic profile	Frequency	Percent		Frequency	Percent
Sex:			**Educational background:**		
Male	9	20,00	Primary school	9	20,00
Female	36	80,00	Secondary school	5	11,11
			High school	20	44,44
Age group:			University	11	24,44
20-25	4	8,89	**Occupation:**		
26-30	17	37,78	Civil servant	6	13,33
31-35	10	22,22	Self-employed	9	20,00
36-40	10	22,22	Retired	1	2,22
41-45	3	6,67	Housewife	29	64,44
46 +	1	2,22			

Table 12: Parents' transportation to playgrounds and the time they spend there

Transportation	Frequency	Percent	Time spent	Frequency	Percent
Type of transportation:			**Visit frequency:**		
On foot	37	82,22	Everyday	13	28,89
By bike	0	0	Once or twice a week	20	44,44
By private car	8	17,78	Once a week	6	13,33
By public transportation	0	0	Once a month	1	2,22
			Less than once a month	5	11,11
			Time spent:		
			Less than 1 hour	4	8,89
			1 hour	8	17,78
			1-2 hours	24	53,33
			More than 2 hours	9	20,00

Table 13: Reasons why parents prefer these playgrounds

Reason for preference	Frequency	Percent
Close to home	38	27,94
Easy transportation	30	22,06
A comfortable/Spacious playground	26	19,12
Children are happy playing here	26	19,12
Safe	6	4,41
Has many play opportunities	6	4,41
Crowded	3	2,21
Has a parking lot	1	0,74

According to parents, children prefer the swing most (53,33%) and the slide second most (22,22%) (Table 14). However, like children, the majority of parents also stated that the playgrounds are not enough (82,22%) (Table 15) and unsafe (68,89%).

In order to elicit information about the playgrounds that parents used when they were children and to make a comparison between those playgrounds and the ones that children use today, parents were asked “What kind of a place and where did you play in your childhood? Can you tell us about that?” The responses were not evaluated in percentages; however, they were interpreted by the researcher so as to portray those play environments. According to the responses, parents in the 20-57 age group that participated in the study played in their childhood in the streets, gardens, villages, high plateaus, meadows and in front of their homes. The parents also stated that in those play areas they also played with water, mud, animals, flowers, plants and their branches, leaves and cones by closely learning about the nature in crowded and safe environments.

Table 14: Which area or equipment in the playgrounds do parents’ children use most?

Equipment/Areas used	Frequency	Percent
Swing	24	53,33
Slide	10	22,22
Climber	5	11,11
Ferris wheel	5	11,11
Football pitch	1	2,22

Parents were asked, “To you, in terms of open space opportunities who is luckier, you or your children? And why?” The responses showed that 66,67% of the parents think that they were luckier than their children are now, and 28,89% think that their children are luckier than they were. They stated that the reasons why they think that they were luckier are that their plays were more creative, that they had the chance to play in areas which were safer and which offered them more play opportunities, that their play areas were in the very nature, that they spent more time playing, that they had the chance to play with more children which allowed them more socialization, and, most importantly, that they had the chance to play outside their homes.

Table 15: According to the parents, are the playgrounds that they use enough for the children to play?

	Frequency	Percent
Yes	8	17,78
No	37	82,22
Small/Deficient/Crowded		
Equipment and plants not enough		
Let the children be in the green		
No bicycle track		
No educational elements		
Unsafe		
Not enough for very young children		
No distinction according to age groups		
Boring, nothing much to do		

They also stated that their children spend more time at home and that there are much more buildings than playgrounds outside. Those who stated that their children are luckier think so because of the fact that there are more play materials today, which gives children different opportunities, and that children feel more comfortable today. 4,44% of the respondents did not state any opinions on this matter.

Finally, table 16 shows the characteristics that children and parents like most in the playgrounds and table 17 shows the characteristics that children and parents disliked most in the playgrounds they use.

Table 16: The characteristics that children and parents like most in the playgrounds

	Child		Parent	
	Frequency	**Percent**	**Frequency**	**Percent**
Closeness to homes	19	21,59	23	51,11
Having many play equipment	15	17,05	6	13,33
Nothing to like	14	15,91	6	13,33
Having green areas/Having trees, flowers, plants	10	11,36	4	8,89
Being a quiet place	3	3,41	1	2,22
Having a level surface	1	1,14	1	2,22
Being large in size	7	7,95		
Having a soft ground	5	5,68		
Being a place for meeting with friends	5	5,68		
Everything is good	3	3,41		
Having sports areas	3	3,41		
Having more opportunities	2	2,27		
Having areas for the disabled	1	1,14		
Being a cool place			2	4,44
Being comfortable			1	2,22
Being safe			1	2,22

Table 17: The characteristics that children and parents disliked most in the playgrounds

	Child		Parent	
	Frequency	**Percent**	**Frequency**	**Percent**
Having old/neglected materials	19	21,59	6	13,33
Not clean	15	17,05	5	11,11
Everything is good/Nothing to dislike	13	14,77	6	13,33
Being insufficient/small for play	7	7,95	3	6,67
Crowded/Noisy	6	6,82	7	15,56
Having no/little plants	5	5,68	1	2,22
Unsafe/Unfrequented	2	2,27	7	15,56
Lack of toilets	2	2,27	3	6,67
Presence of homeless dogs	1	1,14	1	2,22
Having no shadowy areas	4	4,55		
Being by the roadside	2	2,27		
Having little flowers/trees	2	2,27		
Being disturbed by the older children	2	2,27		
Having little empty areas	1	1,14		
Having old floor material	1	1,14		
Being warned by others while playing ball games	1	1,14		
Being distant from home	1	1,14		
Having no football pitch	1	1,14		
Not being suitable for riding a bike	1	1,14		
Being divided into parts	1	1,14		
Everything is bad	1	1,14		
Being hot during daytime			2	4,44
Presence of coffeehouses around it			1	2,22
Being near the road			1	2,22
Unprotected			1	2,22
Equipment not suitable for different age groups			1	2,22

5. DISCUSSION

5.1. Physical evaluation of the playgrounds

According to the data obtained from the 38 playgrounds that the present study investigated, most playgrounds have such artificial elements as swing, slide, sitting equipment, waste basket, see-saw, ferris wheel, climber and exercise equipment (Table 3). In another study carried out in Turkey, it was found that the playgrounds in the city of Tekirdağ have classical equipment and no natural elements (Şişman, Erdinç & Özyavuz, 2010). The data also show that 76,32% of the playgrounds have boundary elements (walls) which are important for safety, and others don't. Playgrounds with no boundary walls especially the ones by the main roads pose danger. Similarly, a study carried out in the city of Elazığ studied a total of 24 playgrounds and found that 60% of the playgrounds have no boundary elements (Açık, Gülbayrak & Turacı Çelik, 2004). Moreover, the number of playgrounds with covered areas, chin-up bars and paint walls is very small. Most importantly, there is no playground with water elements other than fountains (a characteristic which very few playgrounds have (10,53%). In fact, research has shown that playing with water is important for children and that they prefer playing with it (White & Stoecklin, 1998; Simmons, 1994; Acar, 2009).

The majority of natural elements in the playgrounds are plants (97,37%), as seen in table 3. However, some of the plants found in the playgrounds are not in a condition to be used by children as play elements due to their such characteristics as size, type of branching, rugged condition and form. Plants are natural elements and being in interaction with plants contributes to children's learning about the environment (seasonal differences, growing, etc.); their branches, leaves and cones help them to improve their creativity; and the suitable ones can be used by children for such play activities as climbing and hiding (Moore, 1989; Francis, 1995). The topographical options of the studied playgrounds are also extremely limited (18,42%). Yet, topography is an important characteristic which offers children different activity opportunities (Fjørtoft, 2004; Acar, 2009). Again, other natural elements such as rocks, pebblestones and animals, which can help children learn about the lives of other living creatures by seeing, are absent in all 38 playgrounds that were studied. All of these should be taken into consideration when designing playgrounds (Fjørtoft, 2001; Acar, 2013).

When looked at in terms of activity areas, the playgrounds have play equipment, sitting/resting areas and to a lesser extent grass areas (76,32%) (Table 3). However, there are very limited performance areas and free spaces that can be used for such activities as skateboarding/skating/bicycle riding/free activities. In designing a playground, it would not be good to fill the whole playground with play equipment. It is necessary that a playground should have free spaces which will offer children opportunities for individual and group plays in accordance with their creativity. Besides, it was found that the playgrounds that the study investigated did not have any water areas and sandpits other than the areas where sand is used as ground material. As mentioned earlier, not only water but also sand is an important material in the development of children. Especially the wet sand offers children different play options and the opportunity to create objects in their dreams (Moore, Goltsman & Iacofano, 1997).

It was found that rubber is used as ground material in the majority of playgrounds (89,47%), and the second most common grounding material is parquet/square rock

(36,84%) (Table 4). It was found that sand and soil were used as floor material in few playgrounds (2,63%). Contrary to this, another study which studied 57 playgrounds in Turkey found that none of the playgrounds have rubber covering but instead 19,7% of them have sand, 5,3% lawn and 71,9% hard packed soil as the covering material (Uskun *et al.*, 2008).

5.2. Plant species found in the playgrounds

A total of 54 species of tree/small tree, 17 of which were conifeous tree, 37 were broad-leaved trees, and 40 different species of bush were found in the 38 playgrounds (Table 4). It was found that of the trees, Cercis siliquastrum was present in 13 playgrounds (34,21%), and of the bushes, Ligustrum japonica was present in 24 playgrounds (63,16%). Although there is a plant diversity in the playgrounds, plants do not have suitable sizes, forms, development and composition and therefore are not suitable for children's play purposes. Plants are usually not in masses but are individually scattered in the playgrounds. This creates a negative visual effect. Besides, based on some other studies on the topic, some of these plant species should not be used in playgrounds. According to the Moore (2002); in the sample playgrounds *Melia azaderach* (fruit, leaf, bark, flowers), *Ligustrum* spp. (fruit), *Nerium oleander* (all parts), *Wisteria chinensis* (seeds, pods), *Malus* spp. (leaves, seeds in large amounts), *Prunus* spp. (kernel, flower, leaf, bark), *Rhododendron* spp. (leaf) are highly toxic plants ; and *Aesculus hippocastanum* (all parts), *Robinia pseudoacacia* (all parts), *Cotoneaster* spp. (fruit, flowers), *Hydrangea* spp. (flowers), *Eriobotrya japonica* (seeds), *Hedera helix* (all parts, esp. berries) are moderately toxic plants (with their characteristics in parentheses). In addition to these plant types, *Laurocerasus officinalis* (some parts) is also among the toxic plants. Care must be taken when using plants species with allergenic pollens in the playgrounds. Of the plant species found in the 38 playgrounds, *Acer negundo* has an important amount of allergenic pollens; *Platanus orientalis*, *Cedrus libani*, *Morus* sp., and *Juniperus* sp. have moderate amounts of allergenic pollens, and *Cupressus sempervirens* has lesser amount of allergenic pollens (Acar, 2003). In their study, Şişman *et al.*, (2010) found that their sample playgrounds had the *Ligustrum vulgare*, *Nerium oleander* and *Robinia pseuoaccacia* species that have some toxic effects.

As well as the plant species that must not be used in playgrounds, there are species with their peculiar characteristics that must be used in playgrounds. Moore (2002) lists the characteristics of the plants that must be used in playgounds as follows (by exemplifying from the plants in Table 5): fragrance (*Magnolia grandiflora*), texture (*Thuja orientalis*), wind effects (*Lagerstroemia indica*), climbing& swinging, hiding places (*Pittosporum tobira*), play props (*Pinus sylvestris*), fruit/herb & nuts (*Punica granatum*), fall color (*Acer palmatum*), winter berries & evergreen (*Berberis thunbergii*), winter tracery & bark (*Lagerstroemia indica*), winter flowers (*Jasminium nudiflora*), spring harbingers (*Forsythia x intermedia*), shade quality (*Albizzia julibrissin*), physical barriers (*Thuja occidentalis*), wind screens/visual buffers (*Eucalyptus camaldulensis*), wildlife enhancement, erosion control (*Forsythia x intermedia*), drought tolerance (*Koelreuteria paniculata*). Acar's study (2003) on children's plant preferences in playgrounds, children specified their tree and bush preferences. When selecting plant species for use in playgrounds, such functions should be taken into consideration. For, being in interaction with plants allows children learn many things about the environment and life by seeing. However, choosing the suitable plant species only is not enough. That they have suitable sizes and forms is also extremely important for their use by children.

5.3. Evaluations regarding the users' (children/parents) ideas

Administering the questionnaires was the third stage of the study. After the evaluation of the data obtained through the questionnaires, it was found that the findings of the present study show similarities to, and differences from, the related literature.

It was found that children and parents usually come to the playgrounds on foot (Tables 6,12). Parents' reason for choosing the playgrounds are their closeness to the home (Table 13). Research on the topic shows that in order for a playground to be used, it must have an easy accessibility. Similarly, in a study by Özgüner (2011), the majority of the respondents (43%) stated that they preferred in-city parks due to the fact that they are "easy to get, nearby". That the playground is within walking distance or can be accessed easily by bike is important for preference. Chan & Lee (2008) have laid stress on the necessity of accessibility principle among the sustainable urban development strategies for the equal utilization of public services. Similar studies made on the examples of urban green areas both in Turkey and abroad define the accessibility distance for playgrounds as a 10-minute walking distance and 400 m radius (cited in Yenice, 2012).

Play is an extremely important and necessary activity for the development of children. Whether the conditions are suitable or not, a child is always ready and inclined to play in any environment. Accordingly, children were asked to state which places they used for play purposes other that their regular playgrounds. They stated that other than their regular playgrounds they usually played in the neighborhoods, streets and gardens near their homes (47,73%). It was also found that other than these areas they also play at home (38,64%), in the schools, synthetic pitches, internet cafes (2,27%), and other playgrounds, shopping malls and amusement parks (1,14%). In their study, Yılmaz & Bulut (2007) found that children mostly use the following play areas: playgrounds (36,7%), streets (31,7%), home or friends' home (21,6%) and school (10%). In their study, Sideris and Sideris (2010) listed the areas where children do physical activities as follows: schools (35%), parks (25%), back gardens (19%), and streets near their homes (15%). They also found that there are some racial and ethnic differences in choosing the active recreational areas. For example, children of Asian origin play in their back gardens (14,6%), in parks (13,5%), and in streets (5,6%). Contrary to this, white children play in the schools (32,5%), in parks (29,8%), in streets (15,8%), and in their back gardens (13,2%).

The most popular play for children in playgrounds is the swing (60,23%) and the second most popular one is the slide (7,95%) (Table 8). The responses of the participating parents also confirm this. If children's responses are analyzed in terms of gender, the first preference of both sexes are the same; the second preference of girls are blank spaces and ferris wheel, and of boys slide and synthetic pitches. Similarly, Özgüner & Şahin (2009) investigated the then-present conditions of the playgrounds in the city of Isparta and found that children's most favourite play areas were the swing (46%) and slide (32%). Another study made in the city of Elazığ showed that the most popular play equipment was the swing (85,8%) and the second most popular trapeze bars (83,8%) (Açık *et al.*, 2004). In their 2010 study, Sideris and Sideris reported that of the other play equipment 39% of girls and 19% of boys prefer slide and hanging.

Because the fixed play equipment in the playgrounds have limited use and are not changed, they may not attract children's attention over time. In such cases or according to the activities that children want to do, they use other equipment for play purposes. Children stated that they play most with the following respectively: ball games (31,37%), riding bicycles (25,49%), grass areas (20,39%), flowers (12,16%), trees (4,31%), bushes (4,31%); they also stated that they play with the following at lower rates: computers, animals and sand. In a study by Veitch *et al.*, (2007), children using public open spaces also stated that they found open spaces more amusing due to such opportunities as playing ball games, riding a bicycle and playing with play equipment. Most children stated that they liked the natural environmental characteristics such as hiding in the bushes, climbing the trees, and playing with the beetles. If the plants in the plagrounds had been in proper sizes, forms and composition, their preferences by the participants of the present study would have also been higher. And children could have used such materials in their plays. For children's interest in these materials and the importance of their use by children have been confirmed by many studies (Moore, 1989; Bulut & Yılmaz, 2008). In addition, in her thesis study in 2003, Acar observed children's behavior in sample playgrounds in Trabzon. Based on her observations, she found that a great majority of children (93%) were not interested in plants. The reason for this was that children were prohibited by their parents from entering the plant sites. However, during the interviews, children showed great interest to plants by saying such things as "If that plant had been here, I could have hidden behind it, I could have climbed it."

The great majority of participating children (81,82%) think that the palygrounds that they use are not enough for themselves. Similar results were obtained from similar studies made in different cities in Turkey (Şişman & Özyavuz, 2010; Yılmaz & Bulut, 2007). At this point, in this study children were asked about the kind of playground that they wanted, that is, the playground that they dream about. According to the responses, the majority of children (56,88%) want to play in a playground with artificial and structured elements and areas. In other words, the playground that children want most is one which has such play equipment as sports facilities, big and long slides, climb walls, ferris wheel, etc.; electric play equipment like gondola; areas where they can ride bicycles, skate, and perform; and where there are dollhouses and music. In their study, Veitch *et al.*, (2007) interviewed children and wanted them to describe the gorgeous park or public open space in their dreams. The most common idea of all age groups of children was parks that were physically attractive with interesting play equipment. Furthermore, they also stated that they wanted the parks to offer different activities.

In the second place, according to the responses, children (16,51%) stated that their dream playground is one which is large, which appeals to different age groups and which is clean. In the third place (11,93%), children stated that their dream playground is one that has spouts, water jets, pools, water elements and water areas. Finaly, in the fourth place (9,17%), children stated that their dream playground is one with natural areas and elements such as green areas, flowers and trees, plants, and animals (Table 10). Acar (2009), in her doctoral study in which she evaluated the play affordances, examined children's dream playground by using the cognitive mapping technique. She found that of the children that represent three different parts of the city, most of those who live in the rural areas dreamed about playgrounds with artificial elements (though the elements around them are generally natural); those who live between the rural areas and urban areas dreamed about playgrounds with more natural elements (though they have artificial elements as well as natural elements around them). In other words, in the playgrounds children want elements that they have little around them. However, of the participating children those who live in the urban areas wanted playgrounds with more artificial elements. In other words, children playing in the city center did not consider the natural elements as the first preference. This is because of the fact that they do not have any natural elements around them which they can use in their plays. This study has shown that children's dreams about the natural areas and elements take the fourth place and this may be correlated with the fact that they do not have any opportunities to use such material around them. In a study by Veitch *et al.*, (2007), especially some of the adolescents stated that play equipment was not important for them, and that the important thing was to play with friends independently in a safe environment. Apart from this, the dreams of the children that do not use outdoor spaces were quite imaginative. For example, they wanted roller coaster and home play opportunities.

Like children, the great majority of the parents (82,22%) stated that the playgrounds were not adequate/suitable for children to play (Table 15). FuFurtheremore, 68,89% of the parents think that these playgounds are not safe. Similarly, another study on playgrounds made in the city of Tekirdağ found that 64% of the parents did not find the playgrounds safe (Şişman *et al.*, 2010).

Children stated that their most favourite characteristic of the playgrounds is their closeness to their homes (Table 16). Besides, too many play equipment, presence of green areas and plants, size of the area, soft floor, offering the opportunity of meeting with friends, having sports areas, being a quiet and calm place, abundance of opportunities, areas for the disabled, and being a level area were also stated among the most popular characteristics. Similarly, the study by Veitch *et al.*, (2007) found that the most important factor that encourages children to go to the public open spaces is their friends' presence in the playgrounds. Children stated that they were more willing to go to the parks when their friends were there. Furthermore, the aesthetic appearance and attractiveness of the park are also among the important factors. In Özgüner & Şahin's study (2009), children stated that the most important reason for coming to the playgrounds was to play with their friends. The same study also found that the most popular and preferable characteristic of the playgrounds for the parents were that they were easy to get or nearby (Table 16).

Children's most common complaint about the play areas is that the equipment are highly neglected (Table 17). Furthermore, pollution is also an important problem. Apart from these, children stated a total of 20 different problems, the most outstanding of which are the small size of the area, noise, fewer plants, security, lack of toilets and disturbance by the older kids. For parents, the most important problem in the play areas is the same as that of children – that the equipment is old and not enough. Other responses of parents are similar to those of children. In the study by Veitch *et al.*, (2007), the most common problem regarding the use of public open spaces by the 8-12 age group was that the equipment in the play areas were not interesting and that they were designed for younger children. Children also stated that different play areas had the same types of play equipment and that the variety of play equipment was not enough. It was found that children's concerns regarding the play equipment discouraged them to visit the play areas and led them to different activities. They also stated that older children's bullying and hostile behavior affected their number of visits to play areas. Özgüner & Şahin's (2009) study, too, found that children's concerns regarding the play areas are similar. In particular, being disturbed by older children seems to be an important problem. Yılmaz & Bulut's study (2007) also found that the strangers in the playgrounds (15%) and bullying from older children (83,3%) are among children's fears. Sideris & Sideris (2010) state that many playgrounds have been built for younger children and therefore children in 10-13 age group do not visit these playgrounds. Because there are no suitable play areas for children in this age group, they use the play areas built for younger children, which causes problems.

Research has shown that children's access to natural areas in cities is difficult and that the play opportunities for children is more limited (Francis & Lorenzo, 2008). This study, too, revealed that parents find themselves luckier (66,67%) than their children in terms of open space opportunities. There are also parents who think that their children are luckier (28,89%) than themselves and who do not have any idea (4,44%). In addition, as explained in the parents' ideas section, parents stated that their experience with the environment was through their interaction with such natural elements as plants, water, mud, and animals in the natural environment. There are studies in the literature that support these findings (Sebba, 1991).

6. CONCLUSION

In general, regardless of the location and size, the majority of the play areas have such traditional equipment as swing and slide, etc. This facilitates children's access to such equipment whenever they want. However, that the play equipment are similar in all play areas in the entire city results in a uniform playground model in terms of equipment variety. In terms of design approaches, the city of Trabzon does not have any playground originally designed around a certain concept. The existing play areas were designed as the application of fixed play equipment chosen from catalogs according to the size of the area. In the sample play areas, it was found that children use swing and slide more than other equipment and therefore they do swing- and slide-related activities more frequently. Original play area designs must be made, which will allow children to do the same activities in different spatial organizations with different equipment.

When we look at the play areas in terms of activity opportunities, there is a similarity in the whole city as is the case in play area equipment. While there are activities that are parallel to the opportunities that play equipment offer and sitting/resting activities in all play areas, there are no such play areas as wide green areas or water-sand-mud areas where children can do different activities. In fact, quality and original areas offer children different play alernatives on the one hand and contribute to their development on the other. At the same time, such areas will both turn into attraction centers for children and encourage parents from the neighboring cities to visit these areas.

As well as fixed play equipment, equipment that are movable, changeable and that allow children to build new things must also be included in playground designs. In addition, instead of filling all parts of the play area with different activity areas and equipment, designers must create blank spaces that children can use according to their aims, imagination and creativity. These blank spaces may be grass areas where users can sit, lie, run, play ball games; or areas that are covered with timber or rubber or other covering material that are suitable for skateboarding, riding bicycles, battery-operated cars or toy cars. Of the data about children's ideal playgrounds, the ones that are suitable in terms of security and feasibility must be taken into consideration in the designs. Children are the real users of the play areas and their ideas and perceptions of environment are different from those of adults. Therefore, their ideas on the areas that they will use are important.

Natural areas and elements are very important for child development and they must be utilized in play areas at all costs. Alternative designs that will enable the functional use of such elements (plants, topography, water, animal, etc.) in play areas must be developed. In planting the play areas and choosing the plant species to be planted in such areas, species that are poisonous, have allergic pollens, and are thorny must be avoided. Instead, as mentioned in the discussion section, species that are suitable for children to use in their plays and the ones that the studies have found to be children's favourite must be chosen.

Both children and their parents that participated in the study stated that the play areas were not enough in terms of size and opportunities they offer. In fact, this complaint is the same for all play areas both in Trabzon and Turkey. However, open space play areas are very important for children who are the adults of the future, and therefore, such spaces must be handled more consciously, more carefully and more meticulously. According to the findings of the study, the most favourable characteristic of, and the most important factor of preference for, the play areas is their closeness to the users' homes. For easy accessibility to the spaces affects their utilization. For this reason, when locating such play spaces in city plans, attention must be paid to the distance and size of the space. In order to be a solution to the bullying of older children in play areas, which is one of the problems in such areas, the age group for which the play areas are intended must be specified. If separate play areas are created for different age groups and if different activity areas are designed for both younger and older children, the problem of bullying will be solved.

By examining the case in Trabzon, this study evaluated the physical conditions of, variety of activities in, design approaches to, and users' ideas about the play areas in Turkey, presented the findings and made some reccommendations. The findings of the present study will guide the similar studies in the future. By evaluating the play areas in city centers all over Turkey and by identifying their existing conditions and users' ideas about such places through similar studies that will be made in different cities, it will be possible to put forth hints for creating playgrounds that are ideal and that meet the expectations.

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Chapter 4

A Methodological Research on the Investigation of the Urban Landscapes Using Serial Vision Qualities: The Case of Trabzon City

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INTRODUCTION

An individual generates meanings that are less inert to the stimulations from the environment, though, that are led more by process, change and unique individuality (Eckbo, 1975). For this reason, understanding the effect of psychological dimension of an environment on an individual requires an inquiry of how an environment is shaped, the methods by which the individual perceives, comprehends and creates it and most of all, the role that physical conditions play in these scenarios. Since the individuals construct their physical world by conceptualizing their environment (Proshansky, 1970).

At this point, it is critical to understand in what sort of physical process the individuals perceive the objects around and how this information is evaluated in the mind (Aksoy, 1975). Stea claims that the places which can not be perceived at once due to their enormous size need to be perceived by a cognitive organization (Gibson, 1966). Leach advocates Stea's stance by his presumption in which he separated the stimulations our brains receive from the outer world, the place and time continuities into segments (Aksoy, 1975).

With the rise of cognitive psychology in the 1960s, the view has become dominant in which the reaction of the individual to the environment is accepted as a metacognitive phenomenon which does not require cognition. Research showed that this group of reactions stemming in no time from the basic survival instinct does not necessitate much information. Therefore, an individual might love or be afraid of something he never knew or thought about (Ulrich, 1983).

On the other hand, several researchers who argue for the existence of a "potential perception" the individual has against the environment suggest that perception is a phenomenon like a light button which opens up when screening objects and which does not open at all when no objects are screened. The existence of the object in its environment is believed to be "representative" for the object because it allows for the flow of these signals and this is usually regarded as associated with "an internal representation" (cognitive representation) (Kaplan, 1982a).

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According to Jacques individual's mental representation of landscape is important because the experienced landscape is perceived as satisfactory only if the encountered landscape compared with an idealized landscape in the mind. In this context, Jacques claims that preferred landscape is evaluated at two different levels of the sign theory (Hagerhall, 2001);

1) An ideal landscape shared commonly by the society or,
2) Landscapes having special meaning to individuals.

The result of these evaluations is that human-environment interaction creates an "environment image" in the individual and defines an "environmental quality" regarding the environment in the context of how this interaction is perceived, interpreted and evaluated (Rapoport, 1977). With the purpose of explicating this concept which may also be defined as "visual quality" due to its relevance with the visual properties of the environment, firstly the "quality" concept should be fully elucidated with all dimensions. When we examine the glossarial explanations and the landscape-evaluation discipline, we encounter with two definitions for the term "quality" (Daniel & Vinning, 1983, p. 42):

- *"Any of the features that make something (a landscape) what it is; characteristic elements; attributes*
- *The degree of excellence which a thing (a landscape) possesses."*

Daniel and Boster describe the visual quality of a large environment cannot be perceived at once as, *"The perception of a landscape is represented by a distribution of "perceived scenic beauty" values. The distribution reflects the variability of perceptual effects produced by different scenes sampled from the same landscape and by momentary fluctuations in the observer's perceptual processes. Thus, the "perceived scenic beauty" of a landscape is not considered to be a single value, but may be represented by the average of the many perceived values that may result from a number of scenes from that landscape (Daniel & Boster, 1976, p. 18)"*. That's why this study aimed at testing in a certain environment the idea of defining the total visual quality of an environment as the sum of all quality components. Since the sample environment of selection lies in an urban region, the studies in the literature on city perception and urban image of individuals were examined as a first step. The most significant studies in the literature on the definition of urban image, visual perception and visual quality potential of the city are of Lynch (1960) and Cullen (1961).

With no doubt, one of the most important works on determining how a city is perceived, experienced and realized by its inhabitants is the study of the Lynch called "The Image of the City". Investigating the criteria which determine the legibility of a city in this study, Lynch attempted to define the city perception in human mind by mental maps. With this study which he claimed to be conducted with a small sample without any previous training and guiding literature, Lynch formulated a sound ground for studies on city perception, city image and urban aesthetics (Lynch, 1990).

In his study, Cullen dealt with pedestrian images determining the image of a city in the context of a sequence of instant and unsystematic behaviors (typically as the pedestrians forming crowds on the squares and courtyards when turning the corners, entering tunnels, roads and doors) (Cullen, 1961) and argued that aesthetically satisfying sequences of images for a city (he called them as "serial vision") may be created by linking existing views (hereness) with emerging ones (thereness) in the context of color, texture, scale, style, uniqueness and appreciation (Porteous, 1996).

Since visual quality of an environment is defined generally in a broad context overarching environmental/ecologic, socio-cultural and psychological factors (Wherrett, 1998), it has a quite perceptive and objective nature and with this characteristic it is probably one of the most difficult to analyze and measure phenomena (Environmental Assessment Handbook, 1977).

Milbrath and Sahr claim that any measurement of environmental quality is inherently subjective since there are no objective measurements for it. Even an objective measurement of environment proves the opposite, an environmental location has a high quality as long as the individual feels it so (Brush, 1976).

Another point emerging in environmental preference and evaluation studies is that the dimensions of the judgments made by the people so as to make aesthetical choices can be interpreted in various ways. Aesthetical preference can be explained in terms of psychological and artistic dimensions as well as physical ones. Another important finding is that physical, artistic and psychological variables are interrelated in a broad framework but also they can be defined in terms of the others (Elefheridas & Tsalikidis, 1990). Many environment and preference evaluation studies are built upon the assumption that an adopted environment has a high landscape value. This assumption links to another; “the visual quality” regarding an environment is an internal property of that environment and can be expressed objectively. This assumption arguing that it can explain the value of an environment in terms of the values of its components also adopts the view that the “visual quality” is embedded in these components (Bechtel *et al.,* 1987).

As a result of rapid urbanization and mobilized life conditions of our time, recent studies on the urban perception of individuals concentrated on highways and the visual quality for drivers (Clay & Smidt, 2004; Froment & Domon, 2006). In this context, urban scenes on course are addressed in a wide range from "non-space" perception in which the users only notice the targeted scenes selectively (Enderson, 2003; Merriman, 2004) to the dominant role in urban experience of today’s cities (Taylor, 2003; Ode *et al.,* 2007).

In contrast with a body of literature corresponding the kinesthetic urban perception with vehicle traffic (Robertson, 2007), there is a group of studies maintaining that urban experience by walking or riding offer more positive aesthetical perceptions (Zacharias, 2001; Foltêre & Piombini, 2007; Gatersleben & Uzzell, 2007).

MATERIALS AND METHODS

A holistic system is not an object, but one of the ways of viewing an object, and it’s associated with a holistic property that can be understood only as a product of the interaction among the pieces (Aksoy, 1975). In this context, this paper explores how the “**total visual quality**” for a city can be constituted by defining the visual quality pieces one by one during serial vision. It was hypothesized that since the sample urban region is too large for the mind to perceive entirely at once, visual quality for this region may be taken as the sum of all single instant image frames encountered along a certain route (Kalın, 2004). According to this presumption, which was also defined by a number of researchers such as Volkelt, Köerte (he used the term “kinetic perception” in order to define perception during motion), Lynch, Cullen, Jeodicke, Trieb and Çevik (Çevik, 1985), the sum of the selected single image frames specify certain visual qualities for the region in question and within the frame of these visual qualities it’s aimed to define a “**total visual quality / quality image**” for this region (Kalın, 2004).

Being a coastal city along the East Black Sea Region of Turkey, Trabzon was selected as the sample city to conduct the visual quality research.

Trabzon city is surrounded by Rize in the east, by Giresun in the west, by Gümüşhane in the south and by the Black Sea in the North. Due to its topography with a fully mountainous and volcanic structure, it has a coastline elevating inwards right away from the coast and has a linear urbanization texture along this coastline.

Since the cities are too large environments that are not likely to be perceived by the individual all at once, the selection of the route along which the visual quality of the city will be determined is very important. In his/her study on urban image, Lynch (1960) determined roads as the most perceptible components of the city. In this regard, to determine the visual perception and image of the city as in all coastal cities, the coastline of Trabzon stands out as the route that can be perceived with the largest perspective. Thus, in this study aiming determination of the visual quality of Trabzon city, it was also decided to implement visual analysis of the city along the coastline. In this context, the biggest problem (functional or structural) of the city regarding coastal use and perception turns out to be rapid change. When we take into account that if people become aware of the environment they live, if they can perceive the place and construct it mentally, those places may be adopted and appreciated. Therefore it has utmost importance to define how much total visual quality the coastline (which was selected as the venue of application) manifests.

With the purpose of analyzing the existing visual qualities of Trabzon city coastline and proposing a method for “determining the visual qualities of an environment in serial vision”, this study seeks answers to a couple of questions:

- If the “visual quality” of an environment is defined as the combination of different local visual quality components, then what are these qualities?
- What are the qualities determining the “visual quality” whole for Trabzon coastline?
- Can this approach be used as a method for determining visual quality?

Figure 1: Research area

The field of application is a coastal fill area with a width of 250 m and stretching 9 km starting from Ganita up to Çınaraltı region parallel to Samsun – Sarp highway. Being a fill area, the field of application is generally flat and the map showing its location in the overall context is given in Figure 1. In the study, the image frames by which an observer walking between two points (starting from Ganita until Beşirli) will define the visual quality of the area will be determined and by classifying all the captured images according to certain criteria, the “visual quality” for the selected urban region will be defined.

The methods and techniques used in this study are listed below:

Identification of the visual qualities in serial vision

At this step, a comprehensive literature review was conducted and the data obtained were classified in order to specify the qualities that will be sought during serial vision. The "visual qualities" that are proposed after this classification were obtained through examining, and interrelating three different titles, namely Qualities of Townscape of Cullen (Cullen, 1961), design qualities originating from Gestalt principles (Gibson, 1966) and the Design Qualities of Lynch (Lynch, 1960).

The next step covers the capturing of those qualities in the field and their evaluation thereafter. There are a large number of qualities and because this might deteriorate feasibility of the query form, it was decided to merge alike qualities under common titles and to exclude some of the concepts that can not be defined as quality. After this elimination by the researcher, 30 variables were defined to use in this phase of the study. These variables are presented in Table 1.

Table 1: Visual qualities used in the research (Kalın, 2004).

Qualities of Townscape (Cullen)		**Design Qualities (Gestalt Principles)**	**Design Qualities (Lynch)**
• Closure • Vista • Landmark • Undulation • Deflection • Concave spaces • Convex spaces • Dead end • Netting • Gradation • Defining space (by enclosure) • Fluctuation • Mystery and discovery • Caligraphy • Incident, • Enclosure-closure	• Distortion • Continuity • Enclaves (interior open to exterior/ exterior open to interior) • Looking out of enclosure • Juxtaposition • Narrows • Looking into enclosure • Change of level (elevation) • Truncation (foreground cuts out background)	• Figure-ground relation • Similarity • Proximity • Repetition • Continuity • Closure • Legible borders • Figure-ground contrast • Distinction from environment • Gradation • Dominance	• Form simplicity • Continuity • Dominance • Clarity of joint • Directional differentiation • Motion awareness • Names and meanings

Capturing of the visual criteria in serial vision in the field:

Knowing what to sample and whether the evaluations made on the sampling might be generalized to the whole is of utmost importance in environmental preference and evaluation studies and in this context an objective and systematic sampling method is needed. There are two main sampling assumptions for any environmental preference and evaluation study: Firstly, where to locate the point in the landscape (sampling of the dominant point) and secondly where to look at from this point (the sampling of the scenes at the dominant point). Regarding the sampling of dominant points;

- basing the scene beauty surveys on a regional survey that defines environmental characteristics by using statistically hard, geography based samples.
- sampling along the lines that are projected towards random directions on the

field,

- capturing photos during the random walks along the sampling field,
- sampling in the locations where the landscape is sighted most frequently,
- selecting the dominant points along the paths passing all along the field,
- taking samples along the way at equal intervals; are some of the existing sampling strategies (Hull & Revell, 1989).

The studies on what and how to sample to determine serial urban scenes are spread ower a wide range from capturing at certain intervals or capturing every changing point (Cullen, 1961; Appleyard *et al.,* 1966; Stamps, 1990) to video records that are called as dynamic views (Heft & Nasar, 2000) and today even to virtual landscapes (Bishop, 2001; Bishop *et al.,* 2001; Cubukcu & Nasar, 2005).

Considering the fact that systematic or random sampling is determined in tandem with the purpose of the study, it was decided to conduct a random sampling in the field along the excursion route. The qualities specified in the previous step were captured by the researcher in a walk from one end of the field of application through the other. 100 photos were captured in the field that were thought to represent the qualities and 37 of these photos, which were thought not to be representative for the qualities, were excluded.

The evaluation of the photographs with respect to the visual qualities in serial vision and classification of the qualities-Cluster Analysis

63 photos by which the qualities determined for serial vision were sampled were evaluated by an expert group with respect to 30 “visual quality concepts in serial vision”. In order to conduct this evaluation, the visual quality concepts determined for serial vision were transformed into the questions of Likert Attitude Scale. Therefore a survey form comprising 30 questions was prepared.

Due to the large number of photographs (63) and “visual quality concepts in serial vision” variables (30), a survey would not be a valid data collecting tool because the survey would take too much time and the answers might be confused during evaluating the variables (In the pilot survey the participants experienced those problems). Therefore the 63 photos that were left after the first elimination were evaluated by the researcher using the following values with respect to the degree the visual qualities be present in the photos and they were divided into 10 groups by a cluster analysis.

Because a deductive research strategy was used in determining the visual qualities in serial vision, and the variables were measured with a gradual scale, and because the data are to be grouped, cluster analysis was used (Erdogan, 1998) to evaluate the data. In environmental preference and evaluation studies, many researchers such as Canter, Collins, Hershberger, Küller, Lowenthal and Riel, reduced the verbal definitions of the evaluated environment by factor analysis and then grouped them. Besides, another group of researchers involving Groat, Horayangkura, Oostendorg and Berlyne preferred cluster analysis to be able to perform similar grading and multiple scaling in contrast with the flawed dimensions of factor analysis (Hartig *et al.,* 1991).

The aim in the studies (Real *et al.,* 2000) using cluster analysis to group similar data when the number of data is excessive is to group the similar photos and select the most representative one from the group and enable the experts to evaluate qualities over this most representative photo.

Evaluation of the total visual quality for the field of study – Factor Analysis

Explaining too many visual quality variables regarding a photo with a few factors and defining the photo with those factors require factor analysis among statistical tests (Hartig *et al.,* 1991). In this context, in order to determine which quality group is predominant in which photo, factor analysis was conducted to each photo distinctively. The major reason for conducting factor analysis for every single photo in spite of the classification of the general groups with cluster analysis is the aim to determine key variable and groups for each photo.

When interpreting the results of the factor analysis, a number of principles identified by Bennett-Bowers and Harman are considered. In this context, for the data evaluated using SPSS 10, the variables with a factor load bigger than 0.7 are selected as the variables explaining that factor (Kalıpsız, 1988), and the artificial factors with an eigenvalue equal to or bigger than 1 are considered as the factors best explaining the individual.

RESULTS

At this step of the study, the aim was to group the 63 photos representing various image frames of the region and to let the participants evaluate those photos.

When the dendogram demonstrating the results of the cluster analysis pertaining to 63 photos which are aimed to be grouped according to the degree of containing the variables in the theoretical dataset are examined, it can be seen that 10 different groups were identified.

Ten different sets made up by the cluster analysis after these examinations by 63 photos and the photos representing these sets are given in Figure 2.

According to the results of the Euclidean cluster analysis of Ward, 8 groups were formed with a level of 10 %. When these groups and the section in the dendogram which is separated into two pieces are reexamined in terms of the expected data groups, it was decided that that section can be divided into 5 groups and also it was concluded that the group that should be divided into two according to 10 % division may be merged.

Although two major groups were determined at the last step of the dendogram, when the characteristics of the photographs are examined, it was contended to separate the first parts of these major groups into four and to form five groups as a whole from this step of dendogram.

One step after grouping the photos, the variables (qualities) are evaluated over the grouped photos and then they are grouped. For this aim, the photos that were selected for the evaluation of the participants among the photos grouped with cluster analysis are taken and the number is reduced from 63 to 10. The selected photos were graded by an expert group of 20 people with respect to 30 variables (visual qualities in serial vision, Table 1). At the next step, a new hierarchical cluster analysis was performed for the variables graded by the expert group to regroup them.

When the resulting dendogram (Figure 3) of the cluster analysis performed according to intergroup average-linkage method is examined, it can be seen that the 30 variables can be separated into 6 groups with a value of 20 %. When the variables are reexamined according to the groups they were separated, it was decided that it would be more appropriate to merge the second group into the first; and similarly when the variables evaluated in the third group and defined as whole were examined, it was decided that it would be more appropriate to consider the third group of variables as two distinct groups. Thus, within the frame of the data from the dendogram, 30 variables were represented under six groups.

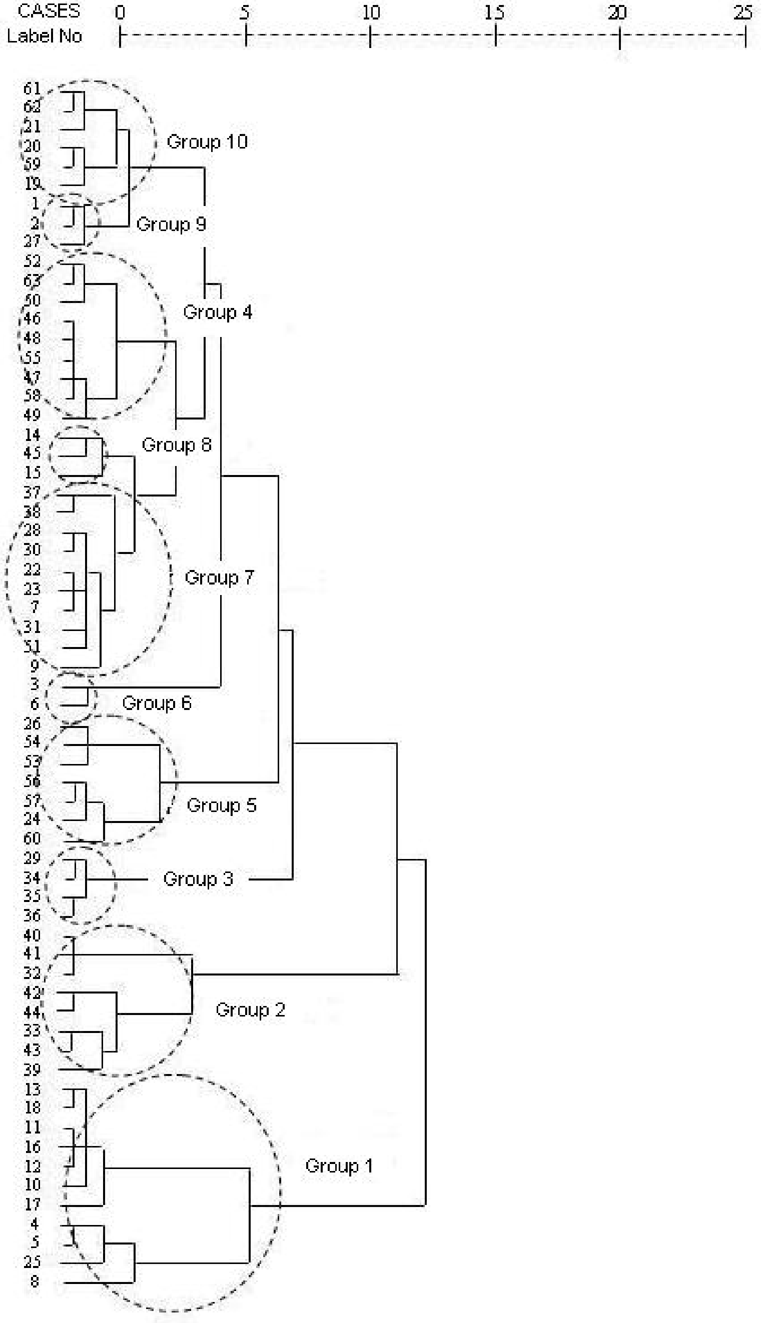

Figure 2: Hierarchical cluster analysis dendogram of photographs.

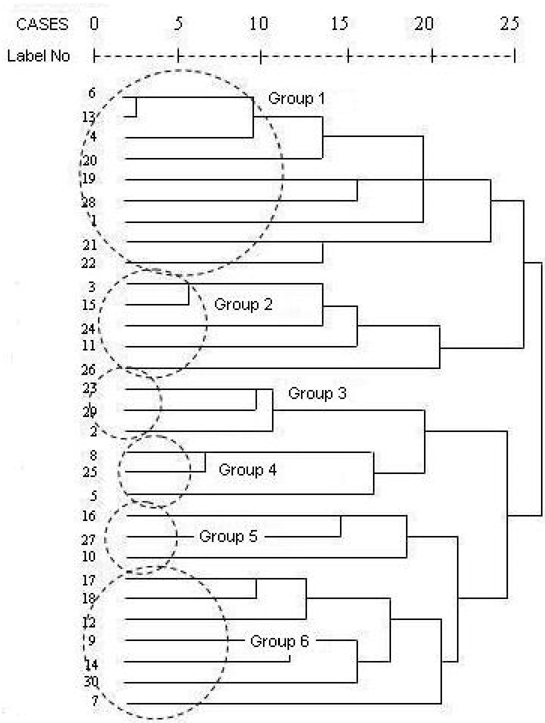

Figure 3: Hierarcigal cluster analysis dendogram of qualities.

First quality group: closure-enclosure

According to the results of factor analysis conducted distinctively for each photograph; the "Closure-Enclosure" group quality elements which are consisted of **enclosure, enclosure-closure, defining space (by enclosure), legible borders, interior open to exterior, looking into enclosure, looking out of enclosure and vista** variables were found to exist mainly in the photos with numbers 14, 42 and 61 (Table 2).

The variables defined in the first and the third factors related to the photograph 14 which shows a motorway that is divided with two bridges are considered as the most descriptive variables for the photo. The "**continuity"** and "**figure-ground contrast"** components determined in the second factor were defined due to the existence of the elements (bridges, trees, telephone posts) that were organized consecutively in the scene. Furthermore, the reason why the "**names and meanings"** component is defined in higher factors is the fact that the general structure of the region has a historical context for the user (The Ganita Region).

The photo 42 related with Ayasofya museum which has a historical and symbolical meaning was expected to be defined under the **"dominance-landmark-names and meanings"** group however since the results of the factor analysis were determined without using any rotation method, all the variables cummulated in a few factors. The reason why Ayasofya was perceived in the first factor mainly with **"closure", "enclosure", "defining space"** concepts is thought to be the contrast between the museum and the texture surrounding it.

Table 2: Factor analysis results of the first quality group

		
14	**42**	**61**

PHOTOGRAPH 14 **Square Sum Loads of Rotation**

Fac. No	Factor Name	Eigenvalue	Percent Variance	Cumulative Percent
1	Closure, Enclosure-closure	3,670	12,232	12,232
2	Continuity, Figure-ground contrast	2,913	9,708	21,941
3	Defining space (by enclosure), Enclaves (interior open to exterior) Truncation (background gets closer)(-)	2,771	9,237	31,178
4	Names and meanings Looking into enclosure	2,648	8,828	40,005
5	Juxtaposition Change of level (elevation)	2,362	7,872	47,877
6	Fluctuation Undulation	2,257	7,524	55,402
7	Continuity	2,216	7,386	62,788
8	Landmark	2,183	7,276	70,063
9	Orientation	2,160	7,199	77,262
10	Netting	2,080	6,932	84,195
11	Vista	1,635	5,449	89,644

PHOTOGRAPH 42 **Square Sum Loads of Rotation**

Fac. No	Factor Name	Eigenvalue	Percent Variance	Cumulative Percent
1	Defining space (by enclosure) Enclosure-closure Legible borders Looking out of enclosure Looking into enclosure	7,314	24,380	24,380
2	Fluctuation (-)	3,451	11,504	35,884
3	Landmark	3,070	10,233	46,117
4	Continuity	2,806	9,354	55,471

PHOTOGRAPH 61 **Square Sum Loads of Rotation**

Fac. No	Factor Name	Eigenvalue	Percent Variance	Cumulative Percent
1	Netting Dominance Figure-ground contrast	5,345	17,817	17,817
2	Continuity Continuity (sequence)	3,406	11,355	29,172
3	Names and meanings Deflection (-) Truncation (background gets closer)	3,288	10,959	40,130

4	Looking into enclosure	2,772	9,241	49,371
5	Looking out of enclosure Narrows (-)	2,499	8,330	57,702
6	Undulation	2,426	8,085	65,787
7	Closure, enclosure(-) Orientation	2,144	7,145	72,932
8	Distortion	1,652	5,507	78,439
9	Enclosure-closure	1,580	5,266	83,705

Ayasofya museum which was observed in the evaluated scene to be distinguished from its environment with strict, sharp borders and an extreme elevation difference was evaluated by the user in this context as **"space defined in a different way"** and with the variables in the first factor group. The emergence of **"fluctuation"** component in the second factor seems to fully support this interpretation. The **"landmark"** concept which is expected to be defined predominantly for this scene is defined in the first factor.

The photo 61 showing an interval defined by two buildings was defined under the first factor with a number of variables from other groups. When this photo defined mainly by the variables of closure, enclosure group with is examined in general; it can be observed that the **"dominance"** concept was perceived from the massive perception from the building in the bottom-left corner of the photo; the **"continuity"** variable from the presence of sequential elements in the milieu determined by the structure of the residence; the **"names and meanings"** component from the fact that the building in the right corner is "Central Bank" and is already known by the observer; the **"deflection"** component from the orientation of the motorway; the **"truncation (background gets closer)"** component from the perception occurring by buildings in the front rows blocking the view of the rear.

Second quality group: continuity-caligraphy-juxtaposition

"Continuity-Caligraphy-Juxtaposition" group of qualities consisting of continuity, repetition, caligraphy, juxtaposition variables were found to exist mainly in the photograph number 6 (Table 3).

The photo which shows the sitting areas and sea sight at a lower elevation from a terrace at high elevation was defined as the sum of variables from different groups under the first factor whereas in the second factor it was defined with the **"continuity – juxtaposition – caligraphy"** group of variables. The border element of the terrace present in the bottom corner of the photo defines the **"incident"** variable. Furthermore the components such as **"undulation", "incident", "dead end", "narrows" "fluctuation"** originated from the elements with different structures adjoining and leading to a sense of continuity (incidence at the same time). The finding that a group of components from the **"closure-enclosure"** group for the photo number 6 are defined under the same factor (5th factor) is also important.

Third quality group: orientation - change of level (elevation)

"Orientation-Change of level (elevation)" group of qualities consisting of orientation, change of level (elevation) and gradation variables were found to exist mainly in the photograph number 53 (Table 4).

Table 3: Factor analysis results of the second quality group

Fac. No	Factor Name	Eigenvalue	Percent Variance	Cumulative Percent
PHOTOGRAPH 6		Square Sum Loads of Rotation		
1	Incident Undulation Figure-ground contrast Looking out of enclosure	4,557	15,189	15,189
2	Continuity Similarity, Repetition Caligraphy	3,297	10,991	26,181
3	Dead end Narrows	2,971	9,903	36,083
4	Fluctuation Juxtaposition (-)	2,680	8,932	45,015
5	Netting Defining space (by closure) Enclaves (interior open to exterior)	2,610	8,699	53,715
6	Focal point	2,404	8,013	61,727
7	Mystery and discovery	2,135	7,116	68,844
8	Change of level (elevation)	2,097	6,991	75,835
9	Deflection	1,867	6,222	82,057
10	Gradation	1,782	5,941	87,997

In the photo which shows a viaduct and sea sight, "**mystery, discovery**" component defined in the first factor seems to be as a result of the gradation in the scene and **"undulation"** and **"change of level (elevation)"** concepts defined in the second factor. Although the **"names and meanings"** component seems to be defined in the first factor, it was defined by the expert group as almost negative. Moreover the existence of the linear elements predominant in the photograph is also supported by the definition of the **"calligraphy"** component in the third factor. When the photo is examined; it can be seen that components from the following different factor groups adjoin due to the dispersed juxtaposition of various elements. This enables the photo number 53 to be determined as a photo defined by various concepts rather than common concepts.

Fourth quality group: dominance-landmark-names and meanings

"Dominance-Landmark-Names and meanings" group of qualities consisting of **"Dominance-Landmark-Names and meanings"** variables were found to exist mainly in the photographs number 49 and 51 (Table 5).

The photo 49 showing descent to the sea through a road enclosed by buildings from both sides was defined under the first factor with **"dominance, landmark, names**

and meanings" group of variables. Although there's no element in the photo that would evoke a certain name and meaning, such kind of consequence stems from the familiarity of the region to the evaluator. Because the photograph being discussed defines the most important point connecting the city center with the coastline.

Table 4: Factor analysis results of the third quality group

Square Sum Loads of Rotation — **PHOTOGRAPH 53**

Fac. No	**Factor Name**	**Eigenvalue**	**Percent Variance**	**Cumulative Percent**
1	Names and meanings Mystery and discovery	3,570	11,899	11,899
2	Undulation Change of level (elevation)	3,386	11,287	23,185
3	Netting Caligraphy Enclaves (interior open to exterior) Narrows	3,229	10,763	33,949
4	Distortion (extreme differences in scale)	2,933	9,775	43,724
5	Vista	2,576	8,587	52,311
6	Defining space (by closure)	2,374	7,914	60,225
7	Juxtaposition	2,182	7,275	67,500
8	Figure-ground contrast	2,176	7,252	74,752
9	Truncation (background gets closer)	2,121	7,071	81,823
10	Incident, dead end	1,751	5,835	87,659

In the scene, the road is enclosed and determined by two buildings and this provides the **"defining space (by enclosure)"** component to be found in the first group. Moreover when the photo is examined; it can be seen that **"deflection"** component result from the orientation of the road, and **"figure-ground contrast"** from the contrast formed by the hard texture of the building structure with the soft texture created by the sea and the green, and **"vista"** component from the sea sight effect. The other components supporting the **"defining space"** component emerging in the first factor were defined in the fourth factor.

When the factors pertaining to the photo 51 which shows coastal terrace spaces and a sea sight are examined, it can be seen that the components belonging to different groups in the first factor are located in a complicated manner.

Table 5: Factor analysis results of the fourth quality group


49


51

Square Sum Loads of Rotation — **PHOTOGRAPH 49**

Fac. No	Factor Name	Eigenvalue	Percent Variance	Cumulative Percent
1	Border Names and meanings Dominance Focal point	4,880	16,267	16,267
2	Deflection Figure-ground contrast Vista	3,939	13,130	29,397
3	Gradation Continuity	2,700	9,000	38,397
4	Enclosure-closure Legible borders	2,521	8,404	46,801
5	Undulation (-) Change of level (elevation)	2,435	8,118	54,919
6	Fluctuation	2,374	7,915	62,834
7	Incident, dead end	1,866	6,219	69,053
8	Continuity Similarity, Repetition	1,853	6,177	75,230
9	Looking out of enclosure	1,827	6,089	81,319
10	Mystery and discovery	1,752	5,839	87,157

Square Sum Loads of Rotation — **PHOTOGRAPH 51**

Fac. No	Factor Name	Eigenvalue	Percent Variance	Cumulative Percent
1	Enclosure-closure Undulation Figure-ground contrast Enclaves (interior open to exterior)	5,657	18,856	18,856
2	Dominance Focal point	3,187	10,622	29,478
3	Continuity (-) Distortion (extreme differences in scale)(-)	2,915	9,718	39,196
4	Orientation	2,718	9,060	48,256
5	Gradation Looking out of enclosure	2,693	8,977	57,233
6	Incident	2,572	8,572	65,805
7	Vista	2,248	7,492	73,297
8	Truncation (background gets closer)	2,228	7,425	80,723
9	Caligraphy	1,548	5,161	85,883

The perception of terrace elements as border element enables the definition of **"enclosure-closure"** component, terrace texture reaching the sea gradually enables the definition of **"undulation"** component and the contrast between the hard ground and the sea and plant cover enables the definition of **"figure-ground contrast"** in the first factor. When the second factor is examined, it can be seen that a group that is expected to emerge for region define the components of the **"dominance, landmark, names and meanings"** group. Since the tower and Ganita textures which have a historical importance for Trabzon are apparent in the scene, this group was defined as a factor with high values. Since the **"continuity"** and "**distortion"** components determined in the third factor have negative values, it was determined that the region does not show the expected continuity effect when the texture of the region in the form of excursion path made up of terraces is considered. The position of the tower from this perspective which gains its enormous and huge texture from its giant size leads the **"distortion"** component to be defined in a factor negatively.

Fifth Quality Group: Mystery-Discovery

"Mystery-Discovery" group of qualities consisting of **incident, dead-end, narrows, mystery and discovery** variables were found to be present mainly in the photograph number 13 (Table 6).

Table 6: Factor analysis results of the fifth quality group

Square Sum Loads of Rotation				PHOTOGRAPH 13
Fac. No	**Factor Name**	**Eigenvalue**	**Percent Variance**	**Cumulative Percent**
1	Deflection Mystery and discovery	3,411	11,369	11,369
2	Continuity Continuity	3,249	10,830	22,198
3	Enclaves (interior open to exterior)	3,155	10,516	32,714
4	Looking into enclosure (-)	2,900	9,668	42,382
5	Netting Looking out of enclosure	2,873	9,578	51,960
6	Orientation	2,790	9,301	61,261
7	Legible borders Truncation (background gets closer)	2,731	9,102	70,363
8	Vista Similarity, Repetition	2,240	7,466	77,829
9	Juxtaposition	2,118	7,060	84,889

The photo showing a scene netted between upper and lower borders was defined under the first factor with **"mystery-discovery"** component. Since too many details reflect a scene, it can be deduced that some of the defined variables (deflection, continuity, continuity) are related to the individual characteristics of the elements in the scene rather than being related to the whole photo. The second group regarding the whole scene is consisted of the **“closure – enclosure”** group of components defined in the third, fourth and fifth factors.

Sixth Quality Group: Undulation-Deflection-Fluctuation

“Undulation—Deflection – Fluctuation” group of qualities consisting of **undulation, figure-ground contrast, incident, fluctuation, distortion, truncation (background gets closer) and deflection** variables were found to be present mainly in the photographs number 27 and 36 (Table 7).

The photo number 27 showing a viaduct and the residence blocks behind was defined under the first factor with **“undulation-deflection-fluctuation”** group of components. The contrasting stance of the viaduct intercepting the existing residence texture in the scene perpendicularly made these components apparent, and enabled the determination of the **“enclosure, closure”** component in the first factor with a high score. The variables defined in the second and the third factors support the same phenomenon; and determine legible borders and fluctuation concepts provided by the sudden intersection of different textures. The **“truncation (background gets closer)”** component has already been expected before the evaluation. Being defined comprehensively as the foreground plane suddenly cutting out the background plane and therefore the perception of the background closer, this component was also determined by the participants as a defining component for this photo.

Although the photo number 36 which shows the residence texture sequence behind the road and border elements is defined with **“looking out of enclosure”** and **“looking into enclosure”** variables in the first factor, since the border element specifies a closure element, the main effect of the photo is defined with **“fluctuation”** variable defined in the second factor.

DISCUSSION

Being a powerful symbol of a potentially complex society, cities should provide a deep and intensive experience for its users as well as providing security in an open and perceivable environment. In the increasing visual chaos of modern cities, ordinary scenes that can be encountered casually may produce new meanings if they are placed in a livelier urban setting. It should be noted that what we seek is nothing more than an open ended order that enables ongoing developments, not obsessed with the concluded ones (Lynch, 1960). The qualities and values an environment should have in the context of the relationship between the visual characteristics of the environment and the visual quality are defined as the readability of the environment, provided visual satisfaction, assigned meaning by evocative perception (Mirzai, 1995).

Defining the way every variable is perceived in environments defined with many variables is a solution approach supporting the “relativity” phenomenon which is brought to “visual quality” concept from individual differences. Having a complex structure, city phenomenon persists on keeping the multi-coloredness made up of differences as long as it maintains the readability of the environment for the users. Several supportive studies (Carr, 1982; Krier, 1984; Keskin, 1984; Çevik, 1991; Kalın, 2004) aimed at defining this diversification by addressing it in several dimensions and determining the qualities of life in an urban context. Under the light of all these evaluations it was determined that; the approach proposed in this paper will be useful in terms of defining the "quality" as the sum of individual qualities in the studies on determining "quality" in an urban region.

Table 7: Factor Analysis Results of the Sixth Quality Group

27 **36**

Square Sum Loads of Rotation **PHOTOGRAPH 27**

Fac. No	**Factor Name**	**Eigenvalue**	**Percent Variance**	**Cumulative Percent**
1	Closure, Enclosure-closure Deflection Undulation	4,349	14,495	14,495
2	Enclaves (interior open to exterior) Legible borders	3,297	10,991	25,487
3	Fluctuation Incident	2,849	9,496	34,983
4	Truncation (background gets closer)	2,671	8,902	43,885
5	Continuity Enclosure-closure	2,648	8,825	52,710
6	Dead end	2,476	8,254	60,964
7	Names and meanings	2,446	8,155	69,119
8	Distortion (extreme differences in scale) Similarity, Repetition (-)	1,884	6,281	75,400
9	Enclaves (exterior open to interior)	1,851	6,171	81,571
10	Figure-ground contrast	1,787	5,958	87,529

Square Sum Loads of Rotation **PHOTOGRAPH 36**

Fac. No	**Factor Name**	**Eigenvalue**	**Percent Variance**	**Cumulative Percent**
1	Looking out of enclosure Looking into enclosure	3,701	12,336	12,336
2	Fluctuation Vista (-)	3,031	10,103	22,438
3	Incident, dead end Similarity, Repetition (-)	2,986	9,952	32,390
4	Dominance	2,834	9,446	41,836
5	Continuity	2,833	9,444	51,280
6	Closure, enclosure-closure Mystery and discovery	2,748	9,160	60,441
7	Enclaves (exterior open to interior) Change of level (elevation)	2,649	8,829	69,270
8	Truncation (background gets closer) (-)	2,616	8,721	77,991
9	Gradation Orientation	2,491	8,305	86,296

When the findings in the study investigating the coastal use of Trabzon city as the sample study field are examined, it can be seen that the “visual quality” is defined by the selection of various scenes. The quality groups defined by these selections define the visual quality of the selected field of study for Trabzon city. In this context, six quality groups were determined in this study:

A. Closure-Enclosure: Generally, in the 10 photo groups determined by all photos of the field of application, there are qualities that define those groups. Closure-Enclosure phenomenon which is defined with the elements such as cover element, restriction with buildings, and separation with bridge elements, gradation, and change of level (elevation) is one of the predominant visual qualities of the entire field.

Although many studies (Lynch, 1982; Nasar; 1992; Palmer *et al.,* 1998) on visual quality preference determine width and depth criteria as properties increasing visual quality, the qualities determining the power of the location perception are determined as “edge, closure, enclosure, legible borders” (Gibson, 1966; Lynch, 1960; Cullen 1961; Özerdim, 1983). In the study, the group defined as “border” phenomenon was outstanding in the scene frames determined as “visual quality element” and this supports the previous result.

B. Continuity-Caligraphy-Juxtaposition: The continuity concept among this group of variables is predominantly present in all of the photos in the field of application. The continuity determined by caligraphy, juxtaposition, repetition, gradation, and sometimes by enclosure is defined as one of the most effective qualities of the field.

In the researches, continuity concept is defined as the presence of the naturalness, perceptibility-legibility, and consistency and meaningfulness concepts in the uninterruptedly perceived image.

For example Krupier argues for continuity of the hierarchical order among the design principles in different scales and suggests that this increases visual quality (Kuiper, 1998). Similar researches consider the relationship between the uninterruptedness of the naturally continuous elements, especially the green texture and landscape quality (therefore visual quality), as the “naturalness” being the main criterion for preference (Kaplan, 1983), and the definition of the continuity of naturalness as "park alike" (Ulrich, 1983). Moreover the studies that describe natural environments with a low level of complexity (Wohwill & Kohn, 1976) and thus with a visible level of continuity and explain “natural” as a psychological category and argue that it is determined by curved contours, and uninterruptedness of form and color (Ulrich, 1986) also stress the concept of continuity. Therefore it is inevitable to search for a “continuity” phenomenon defined in the quality whole within those bounds after the border component is defined.

C. Orientation - Change of level (elevation): The most important element for the coastline which usually demonstrates a straight line is observed as the deflections which connect the coastline to the city by elevating from a lower elevation to a higher one.

The deflections under this title which are usually defined as deflection, fluctuations, concave and convex spaces (Özerdim, 1983) are suggested to evoke discovery feelings (Cullen, 1961) and to enable orientation with elements such as sound proof walls, ground and stairs (Çevik, 1991). Lynch states that this kind of orientation and changes of level (elevation) without losing its consistency provide motion perspectives (Lynch, 1960) and allow for surprises (Çevik, 1991). Therefore they are among the qualities guiding design.

Among the studies that are in line with our findings; the study in which Cullen defines the city in the context of visual analysis (Cullen, 1961) examines the city in the context of serial scenes, whereas the study of Lynch on urban image (Lynch, 1960) considers orientation and change of level (elevation) as criteria. Among the studies that are in line with our findings; the study in which Cullen defines the city in the context of visual analysis (Cullen, 1999) examines the city in the context of serial scenes, whereas the study of Lynch on urban image (Lynch, 1966) considers orientation and change of level (elevation) as criteria.

D. Dominance-Landmark-Names and Meanings: The reference points for the city which have been retained so far in the historical development process of the coastline such as the tower, Ganita and Hagia Sophia museum are defined with this variable group. Also the points such as Kanuni statue and central bank with the functional characteristics of being landmark and being known are the other points with an inclination of being defined with this group of variables.

The studies arguing that the justification for the nature perception of the individual living in a certain environment is the previous experiences of the individual defined by the similarity, innovation and unfamiliarity of the individual with that piece of nature (Wohlwill, 1983) suggest that the preference increases with an increase in that experience (Wohlwill & Kohn, 1976; Kaplan, 1982a; Stea, 1982; Bechtel *et al.,* 1987) because all those experiences play an effective role in the formation of meanings and namings regarding the space (Çevik, 1991; Kalın, 1997; Özbilen & Kalın, 2001).

Mental openness is of utmost importance in the acceptance, adoption and appreciation of an environment (Kaplan, 1992a). Cognitive openness develops in the context of the perceptibility and meaningfulness of the objects examined. Predominant elements in a continuous texture help giving meaning (Cullen, 1961), whereas meanings and names pertaining to locations (Lynch, 1960) increase adoption.

The points determined under this component group because of their historical context, being landmark and being known in the application study stand out as the elements determining environmental image. These findings support the components in the study of Kaplans on naming a location (Kaplan, 1982b; Kaplan, 1992a; Kaplan, 1992b) and the names and meanings in the study of Lynch on urban image in the context of the positive contributions of environmental image to environmental experience.

E. Mystery-Discovery: The elements of this variable group emerge primarily in the photos defined with restriction, enclosure and frame. In this context, the images enclosed by view and building sides among the frames forming upper, lower and lateral borders for the whole field of application give the feeling of mystery and seem to be defined with the desire for discovery.

Mystery when defined as one of a series of probabilities what to come next, evoke the thought that one can see more when one comes closer to the landscape (Kaplan, 1992a). Evoking the desire to discover, mystery constitutes an important visual quality as scene level (Kaplan, 1992a) giving information on both the opportunities and the dangers in the urban image (Kaplan, 1992b) as in all environmental images.

In the studies supporting the finding of our paper on mystery and desire to discover, Kaplans investigated the progression in the scene by gaining information (Bechtel *et al.,* 1987); Appleton investigated determination of the opportunities and dangers (Kaplan, 1992a); Berlyne and Nasar investigated the innovation-the pleasure taken from the scene relationship (Nasar, 1992); and Cullen investigated the mystery with different restriction dimensions (Cullen, 1961).

F. Undulation-Deflection-Fluctuation: This group of variables is defined with the photo frames displaying truncation (foreground cuts out background), alternation of building texture and plant texture and deflection along the linear route in the field of application.

Complexity-diversification concept which supports innovation as well as mystery in urban image is one of the concepts that are researched most frequently (Kaplan, 1982; Ulrich, 1983; Fenton & Reser, 1992; Kaplan, 1992a; Orland *et al.,* 2000; URL1).

Complexity is a determined variable for an urban image as well as giving meaning and perceptibility. For this reason deflection, fluctuation and undulation in the monotonous coastline will be determined as the qualities affecting the perception positively. This supports the studies on complexity-aesthetic relationship (Daniel & Vinning, 1983; Orland *et al.,* 2000); on the relationship between complexity and mystery (Ulrich, 1983); and also the studies on the relationship between complexity and perceived beauty (Ulrich, 1983; Orland *et al.,* 2000).

CONCLUSIONS

The weakest side of the environmental preference and evaluation studies is without doubt the fact that the relativity concept makes many aesthetical preferences simultaneously true. Therefore, in that kind of studies, relativity turns out to be a presumption and those studies might be generalized only to the environment and user group used in the study. So as to surmount this argument that prevents making generalizations, visual quality was defined as the sum of individual qualities and this definition was addressed in a broad perspective encompassing all likely qualities.

It can be seen in the study that, this visual quality whole is amassed under certain titles under the qualities derived from environmental preference and evaluation literature. This enabled a systematical classification by allowing listing similar urban images in the broad image variety defined by the city under certain groups. Thus, the way Trabzon city defines a total visual quality is demonstrated as well as creating a basis for the next step of studies on identifying and strengthening the weakened qualities of the urban image.

One of the questions posed in the study was whether defining visual quality as the sum of many qualities can be considered as a method. When the main quality titles and the sub quality groups that were defined for Trabzon city are examined, it was found that very different visual perspectives were defined regarding the general image of the city. Therefore, it can be judged that the study may be considered as a method for the visual analysis of the environment. Although defining a visual quality concept for environment brings up an evaluation and judgment process, it seems inevitable to firstly address the definition dimension of the problem. In this context, the method of defining the visual quality for environment as the sum of a number of qualities and demonstrating this whole by defining the individual qualities rather than articulating the appreciations about these qualities is proposed as an alternative to the relativity concept in the environmental preference and evaluation studies.

As a consequence, if the reason for the preference of an environment, particularly of large environments that are hard to perceive at one glimpse is the qualities of that environment, then it will be necessary to demonstrate what kind of a whole those qualities define. This study is also important by its determining approach about with how many different scene frames can an urban environment be defined and how many different quality groups can these frames define. And also it should be evaluated as a sample practice that can be easily used in similar studies because of exemplifying how to use sequential views (serial scenes) in defining an environmental value.

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Chapter 5

Sustainable Management and Protection of Historical Landscape: The Case of Bakırköy Mental and Psychiatric Diseases Hospital Garden, Istanbul - Turkey

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INTRODUCTION

The development pressures in metropolitan cities constitute a risk on the urban green areas, historical and cultural areas which are allowing recreational possibilities to people. Urban green areas may act as hot spots of biodiversity in urban areas (Cornelis and Hermy, 2004) and can support the preservation of endangered and rare taxa (Kowarik, 1998; Kunick, 1978; Li et al., 2006; Reidl, 1989; Kümmerling and Müller, 2012). Even if historic urban green areas are valued foremost as heritage sites, they are also credited for their ecosystem services and positive aesthetical and social values (Kümmerling and Müller, 2012; Bolund and Hunhammar, 1999; Chiesura, 2004). Some historic urban green areas can be cultural heritage along with other surrounding structures and historical value.

The mean of cultural heritage changed and the concept of protection developed with The Venice Charter- (1964).

Expansion of scope of cultural heritage and scale up from a single structure to protect with its environment have turned to planning problem which is multidimensional, complex and sometimes including contradictory views. Urbanization pressure and it increased property values in parallel, increasing traffic, pollution and other negative effects of environmental factors are important for historical green areas. On the other hand social and functional transformation have made significant to protect to both of original identity and its habitant of historical environment (Enlil, 1992; Aksoy and Ünsal, 2012).

In Venice charter defined extended memorial concept is discussed in a different way by UNESCO in 1976. In addition to cultural property, geological formations, vegetation, water element, wildlife areas, historic gardens which is valuable respect to esthetic and scientific are highlighted as “natural heritage” (UNESCO, 1976). UNESCO contract based in Turkey, movable and unmovable natural and cultural heritage

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efinition is accepted. Protected areas are classed as natural, historical, archeologic and urban site (UNESCO, 1976).

Istanbul is a fast growing city which has been gained its size in the last decade. Because of rapid urbanization and crowded population, land prices are very expensive. Because Istanbul is home to many ancient civilizations, it is very important that has rich historical and cultural heritage. So there are lots of historical and green areas which are under the pressure of urbanization in İstanbul. In addition to this, historic urban areas are being continues improvement efforts. Some historic gardens and open green areas are very sensitive to use and development so that the need of the protection and sustainable using are a vital key topics in the urban planning and application decisions. One of these historic gardens is Bakirkoy Mental and Psychiatric Diseases Hospital Garden which is located in the center of the Istanbul. We selected it for study because:

1. It is a 'typical' garden of republican period
2. There were no changes to design style for approximately a hundred years
3. There was rich historical material on garden and plant use suspected
4. It is a just one big green area in its urban environment and
5. An area which is showed all functional properties of a woodland.

Our research questions were:

1. Which design principles, plant material and technical implementation were used during the creation and management of the garden?
2. What is the current value of the garden for trees conservation?
3. What is the relationship between design principles and the present-day value of the garden?

We compared our results with similar historical garden and make suggestions for future sustainable garden design, restoration and management. Restoration studies of Bakirkoy Hospital and its environment is come into question in recent years. Besides the restoration of existing building, some building will be destroyed and rebuilt. In addition to this, some new buildings will be built. In this study, restoration possibilities of Bakirkoy Hospital Garden without damage of garden's historical values and with original function were investigated. With this study, we want to highlight this garden and its historic value and these values should be protected and management in a sustainable manner, finally the area uses should not be changed.

2. STUDY SITE

Bakirköy Mental and Psychiatric Diseases Hospital Garden is located in the Bakırköy where European part of Istanbul (Figure 1, 2). Mean annual rainfall in the area is 649.1 mm, mean annual temperature is 13.8 C^0 and mean annual soil temperature is 15.6 C^0 (Council of Turkish Republic, 1983).

There is some sedimentary rock like limestone, sandstone, flysch and marl generally (Council of Turkish Republic 1983). Research area is surrounded by multi-lane roadways with dense traffic, multi-storey hospitals, establishments and residential (Figure, 1,2). It has 930,128 m^2 open green areas. Hospital garden serves to patients, their relatives and the people living around the hospital. There is a special zone which is being used among 9:30-12:00 a.m. for patients in the hospital garden. In this zone, there are volleyball and tennis courts, greenhouses and indoor gardens. In the indoor garden, hobby gardens, picnic tables, arbors, pergolas, gazebos, benches, movable tables and chairs, pool and fountain are located.

Patients are resting, watching environment, chatting, getting around, sitting on the grass and extends, playing a ball, playing games with natural elements such as plants and stones, and reading in the garden.

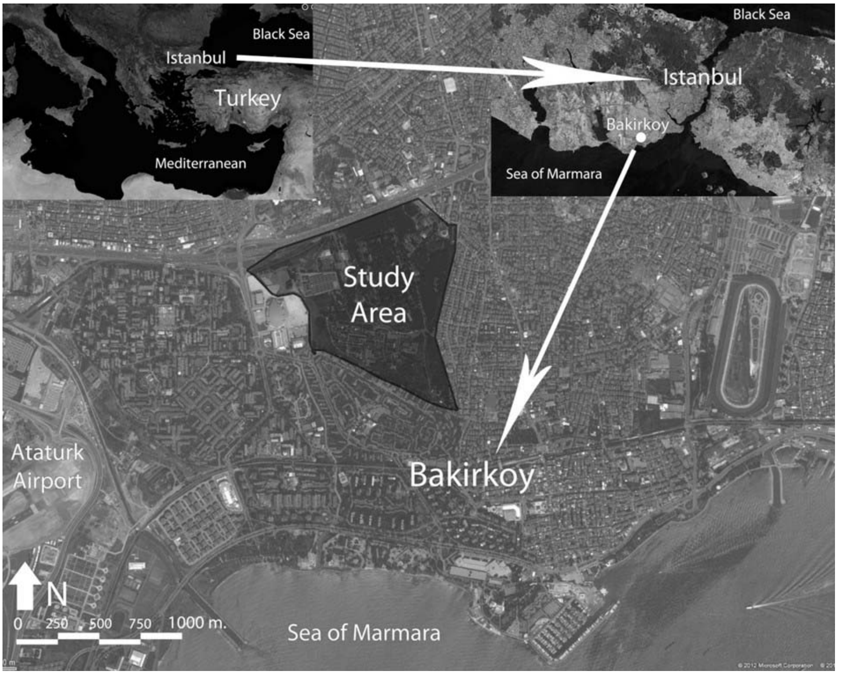

Figure 1: The location of Bakırkoy Psychiatric Hospital Garden

Figure 2: The view of the Bakirkoy Psychiatric Hospital Garden (Original, 2015).

The main roads and vehicle roads of hospital are asphalt coating. Concrete pavements are 15 cm high. Pedestrian paths are concrete paving and footpath in the wooded. A large part of the hospital's garden is surrounded by a wire mesh fence beside the protected stone wall (Figure 3,4).

Figure 3: Wire fence and concrete pavement lock (Original, 2014).

Figure 4: Stone wall and asphalt driveway (Original, 2014).

Figure 5: Paths at the I. Protected Zone (Original, 2014).

Figure 6: Brick wall and concrete pavement at the II. Protected Zone (Original, 2014).

The area of the hospital is always revenue earning area for construction companies. In previous years, some companies has made ground and land survey in the Atakoy and O-2 (E-5) highway parts of the hospital garden and they want to build a road at neighborhood building near the Atakoy 4. part of the hospital garden. Recently Ministry of Health, department of the health investment has a project for this area. The project illustration has given in figure 8 (Anonymous, 2014a). In this project which is called Integrated Health Campus is a big project which consist 538 bed gynecology and children hospital, 278 bed cardiovascular hospital and 227 bed Oncology hospital, totally 1043 bed hospital will be build in this area. In this project they want to destroy all the buildings of old Bakirkoy Mental and Psychiatric Diseases Hospital.

2.1. The Historical Building Elements

Reşadiye Barak's are the most important element in the area as a cultural heritage. In addition to this, Prof.Dr. Mashar Osman's who is founder the hospital building, Mazhar Osman's sculpture, reproduction of Rodin's thinking man statue, sundial ve Resadiye Baraks's wall (Figure 3, 4) are protected with II protected degrees. Monumental entrance, Mosque, open cistern are registered as a cultural heritage with the 20.03.2008 date and 651-5 number cultural heritage degree (Anonymous 2008).

Figure 7: The Kemal Künnat's production in the hospital garden as an important landmark (Original, 2014).

Figure 8: Some project for Bakıirköy hospital area without protected view (Anonymous, 2014a).

The Hebdomon (Byazntium) Hypogeum which is in the historical ruins discovered during the construction of Resadiye Baracks started to build under the orders of Sultan Resad in the year 1914, is a monumental grave structure belonging to the Byzantine era. Although it is not known who the Hypogeum belongs to and when it was built precisely, it is dated to 5th century by the decoration style on the graves and the wall workmanship in the grave chamber. The marble sarcophagum container in the form of a bath tub located in the inner yard of the Bakirkoy Mental and Psychiatric Diseases Hospital come from and when they were discovered, it is beyond doubt that they must have been discovered in a place not too far from where they are displayed now. Three different column heads decorated with acanthus leaves of Corinthian type located in the inner yard of the Hospital. Another one of pieces from the Byzantine Period located in the inner yard of the Hospital is marble stone in the form of a column. It was used as a fountain for a long time by opening a hole in the middle (Figure 4).

The process of moving the psychiatric hospital was completed on June 15, 1927. Some contributions were made to landscaping and renovation of the buildings during in 1940s, the area called the "Inner Garden" where the hospital was built, the area was enclosed in a wall of 4000 meters in length. Figure 14 show that an old picture of the road which is near inner garden. The buildings of Resadiye Barracks were restored (Figure 15). Also these buildings are historic heritage buildings from Ottoman era and are licensed by the High Council of Immovable Monuments and Antiquities. The "Thinking Man" statue was opened, which became one of the symbols of both Bakirkoy and the psychiatry circles of Turkey (Figure 7).

In 1960s, plans and projects were prepared to establish modern psychiatry in the hospital and the treatment by preoccupancy method that had been used since the first day the hospital was founded was improved. Nearly a thousand patients were made to join collective sporting activities outdoors for the first time in our country and feasts were organized once a year in the sporting facilities of the hospital (Anonymous, 2014b).

Figure 9: The marble Byzantine sarcophagum container (Tuna, 2000).

Figure 10: Byzantium Hypogeum located at the pine grove (Tuna, 2000).

In 1990s, renovations were made in the functioning and communication processes of the hospital. The hospital now has the most developed Daytime Hospital and Rehabilitation Center in Turkey and plays an important role in clinic researches and scientific output (Anonymous, 2014c).

Hospital museum was established for sustain and recognition to hospitals historical and cultural value in 2008 (Anonymous, 2014c).

3. METHODOLOGY

Within this study, a new planning strategy for nature and landscape remediation of a historical garden in Istanbul was developed. First, this approach directs nature conservation efforts primarily towards the trees and green landscape. For this aim the plants texture was analyzed by the surveys in the area. The study area was divided into twenty one parcels which were shown homogeny characteristics as a typology of vegetation. Some parcels were divided into sub-parcels (Figure 16).

It was determined of plants information according to method of Dirik (1996) and Paulin (1989). The information of plants characteristics were written to the plants form. The forms were consist of the variety and species, approximate age, approximate height, approximate trunk diameter, multiplicity and cover degree, wellness and up growth position, trunk quality and property information. After analysis of these characteristics, it was determined that protection of important trees and tree groups.

Figure 11: Marble pieces of structures belonging to the Byzantine Period (Tuna, 2000).

Figure 12: This marble stone in the form of a column was used as a fountain (Tuna, 2000).

Figure 13: Three different column heads of Corinthian type (Tuna, 2000).

Second, both cultural values in using and biological values were integrated to achieve a holistic landscape perspective. This is sustained with and understanding and evaluation of areas biological values. We have identified that Bakirkoy Hospital and their environment needs a sensitive plan. This plan should seek to balance to protection and use, because the hospital area includes natural, cultural and recreational resource values in many features. For this reason, the protection and using area have separated to zone and finally, the model of protection-supported usage emerged as the most suitable management and some suggestions were given for protecting, using and remediation of these zones.

Three alternatives were developed within the method and were targeted at preferring the most convenient alternative considering all criteria and sub-criteria. These were Zone I: Absolute Protection, Zone II: Use with Protection Priority, and

Zone III: Protection with Use Priority. The dual comparison necessary for prioritizing criteria, sub-criteria and alternatives in the hierarchical structure was performed by a group of experts who knew the area.

Figure 14: Old picture of hospital road (Anonymous, 2015a).

Figure 15: Old picture of Resadiye Baraks (Anonymous, 2015b).

4. RESULTS AND DISCUSSION

4.1. Vegetation

The result of vegetation types showed that three main character group is suitable for areas vegetation texture. Table 1 showed all the sub-types which is composing character groups. This grouping is very important and directive for the land use-protection decisions about healing gardens, visitor's gardens, and the importance for the urban structure and for general use. All the Subjective and Objective properties of sub types which are composing main vegetation types are given in table 1.

According to Table 1 there isn't any monumental tree or the tree which has monumental property in the study area. But, we can says that *P. orientalis* which is 120 cm diameter and some *C. sempervirens* which are near the existing building and *P. brutia* species which are bigger than 60 cm diameter should be protected.

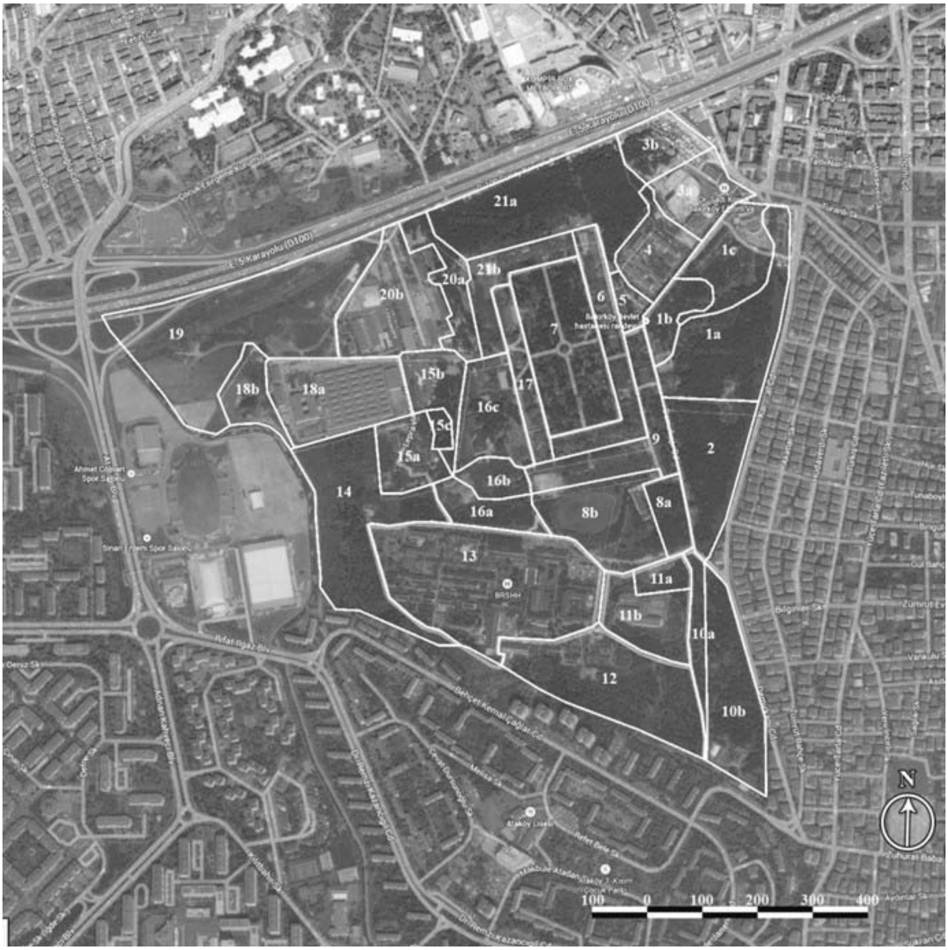

Figure 16: Parcels and sub parcels on research area.

The planting texture could be separated to three categories for protection (Figure 17). The first zone which is consist mature trees and it has good properties of wood should be protected. In addition to this to development and remediation works should be done in the first protected zone. Especially weak and unhealthy plants should be eliminated. It is done pruning for removing dry sticks and upraising tree's corolla.

In light of detail survey, protection rules must be applied for the II. Protected Zone. In this projection, some of the trees should be protected in situ and some of the trees which are not to fit for the area can be removed or can be transplanted to new places, to parallel with the concrete plan decisions.

The third zone which is consist mature trees and young plants is suitable for different using decision. The young plants can be move the other suitable area easily without important arboricultural work.

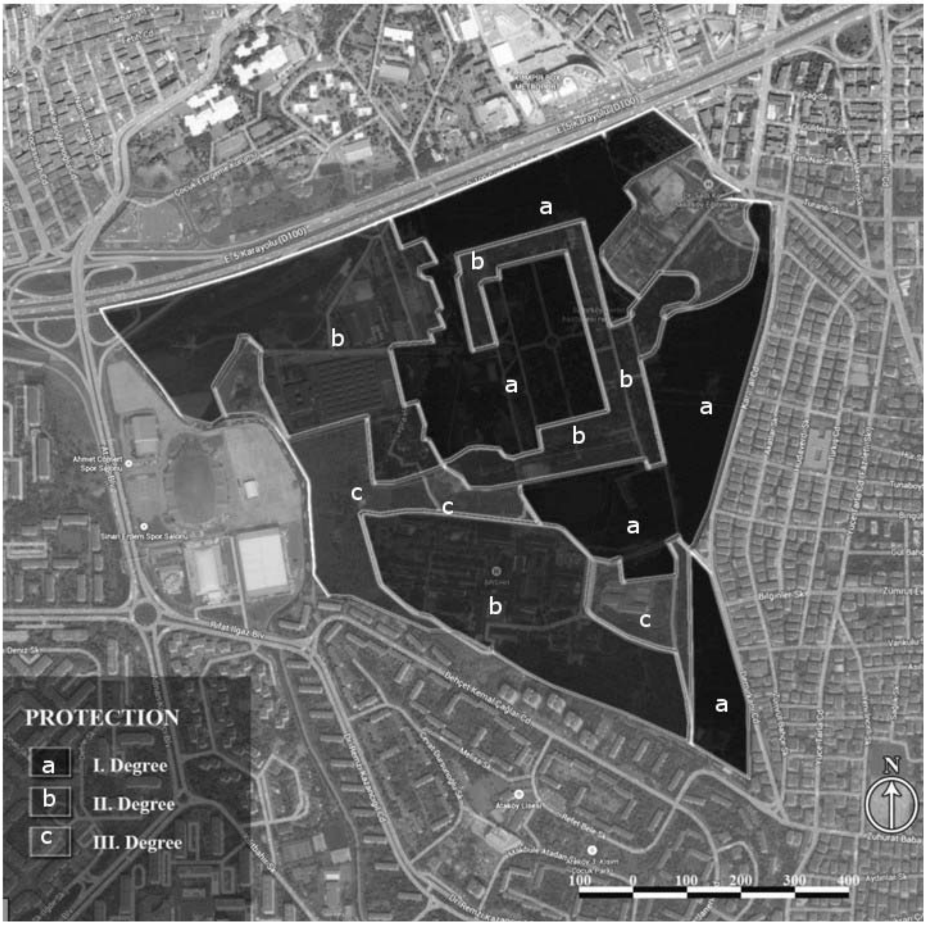

Figure 17: The map which is showed main type of protection characteristic.

In this study, our aim is to find out the land use decision with the consideration of historical gardens' vegetation and protection properties. For this reason, four different functional uses about open green spaces types which are consisted different protection zones has been identified for this historic garden. This open green spaces uses can be classified as open to public access, green spaces, healing gardens and actual development areas. Figure 18 shows that the land-use map of the research area.

a. Open to public access open green spaces: This area is covered by mass planting which branchless trunk highness is sufficient, open to view and sufficient closure. This zone has mature trees and young collectively integrate plantation. These plantations are mostly massive monotype, pure or mixed young plants. These areas are in the III. Degree protection statue.

b. Green areas that near buildings: these areas are split in half as historic protection buildings and new buildings. At historic protection buildings front gardens should be planted to show local planting design amenities. The mature plants and I. degree protection zone trees in this section should be protected from new plant materials. Planting design in this section should be in protection manner. Red zone

Table 1: Some properties of tree species accompanied to Bakirkoy Psychiatric Hospital Garden vegetation

Parcel	**Plant species in the parcel**	**Tree height (main m.)**	**Tree age**	**Tree diameter (cm.)**	**Crown coverage (%)**	**Characteristics**	**Crown height (m)**
1A	*Pinus brutia*	8-12	70	25-30	100	monotipic	5-8
1B	*P. nigra*	6 – 9	60-70	20-25	30	monotipic	3 – 5
1C	*P. pinea,* *P. brutia*	2 – 5	10	5-12	30	monotipic	1
2	*P. brutia*	12 - 14	40	20-35	100	monotipic	5 - 8
3A	*Ornamental plants*	3 - 9	10-30	5-25	50	multi storied	1 - 3
3B	*P. brutia*	8 - 12	40 - 70	8	100	monotipic	4 - 6
4	*Tilia argenta,* *Acer negundo,* *Cedrus atlantica,* *P. pinea,* *C. australis,* *G. triacanhos,* *Cupressus sempervirens,* *A. altissima,* *L. indica,* *J. regia,* *Robinia pseudoacacia,* *mixed*	4 - 10	5-25	8-20	100	monotipic	1 - 3
5	*R. pseudoacacia,* *C. sempervirens,* *Fraxinus exelsa,* *Pinus brutia*	4 - 10	70	35-50	60	multi storied	5 - 9
6	*R. pseudoacacia*	6 -12	5 - 60	20-40	40	multi storied	3 – 8
7	*P. brutia,* *T. argentea,* *C. sempervirens*	8 - 18	20- 200	70	80	multi storied	3 – 8
8A	*P. brutia*	8 – 12	70	25-35	100	monotipic	5 – 8
8B	*P. pinea,* *Cedrus libani*	4	15	10-15	60	monotipic	1-2
9	*P. brutia,* *P. nigra,* *R. pseudoacacia,* *P. pinea*	5 - 14	15 - 70	5-40	60	mixed - multi storied	2 - 6
10A	*P. pinea*	4	15	10-15	50	monotipic	1-3
10B	*P. brutia*	8-12	70	25-30	100	monotipic	5-8
11A	*P. brutia*	9-13	40-50	25-30	70	monotipic	1-2
11B	*P. pinea*	1-4	6-15	8-17	50	monotipic	1-2
12	*R. pseudoacacia,* *P. pinea*	4-8	10	10-25	80	monotipic	1-4
13	*R. pseudoacacia,* *P. pinea*	4-8	10-25	8-20	50	single storied-monotipic	1,5-4
14	*P. pinea and fruit trees*	4-6	15-20	15-20	80	single storied-monotipic	2,5

Table 1: Continued

Parcel	Plant species in the parcel	Tree height (main m.)	Tree age	Tree diameter (cm.)	Crown coverage (%)	Characteristics	Crown height (m)
15A	*P. brutia,* *T. argentea*	3-12	10-25	3-15	30	mixed	1-8
15B	*P. brutia,* *R. pseudoacacia,* *Ailanthus altissima*	12	70-80	25-30	100	single storied-monotipic	5-8
15C	*P. brutia,* *R. pseudoacacia*	10- 14	10-75	8-70	90	single storied	1-7
16A	*P. pinea*	5	15	10-15	75	single storied-monotipic	1-2
16B	*R. pseudoacacia,* *Morus alba*	6-16	15-75	10-65	40	multi storied	3-8
16C	*P. brutia*	7-14	30-70	25-55	65	single storied-monotipic	3-7
17	*P. pinea,* *T. argentea*	5-20	10-70	5-50	40	multi storied	3-8
18A	*Pinus sp.*	-	-	-	-	single storied	
18B	*P. brutia,* *R. pseuda,* *Populus alba*	5-7	25	15-20	80	single storied-monotipic	3-4,5
19	*R. pseudoacacia,* *Cedrus deodora,* *A. altiissima*	3-7	10-15	8-18	20	single storied-monotipic	1– 4
20A	*P. brutia*	8 – 12	70	25-30	100	single storied-monotipic	5 – 8
20B	*P. alba,* *F.excelsa,* *A. altissima*	3-12	10-40	10-35	20	multi storied	1-2
21 A	*P. brutia*	8 - 12	40 - 70	8	100	single storied-monotipic	4 - 6
21 B	*R. pseudoacacia,* *A. altissima*	8 - 14	10 - 60	6-50	30	single storied-monotipic	3 – 7

At new buildings green areas planting design should be pleased to eye with new buildings. In this section visually is most important factor. Blue and white zone

c. Healing gardens: These areas are contained mature trees with mass planting character which create a grove. These areas are I. degree protection zone. In these areas, a living calendar should be placed. In addition to existing trees some conifers, calicanthuses, spruces, firs can be placed in the area with perennials like violets. Autumn plants like *Acer sakkarinum*, *A. ginnala*, *Luqiadamber strasifolia*, *Abelya floribunda*, *Amphelopsis radicans*, *Pyracantha coccinea* are very impressive in Istanbul climate. Summer plants like *Albizzia julibrissin*, *Hibiscus rosa-chinesis*, H. mutabilis, *Begonia rex*, *Hydrangea macrophylla*, *Lagerstroemia indica* and spring plants like *Cercis siliquastrum*, *Prunus cerasifera pissardii nigra*, *Forsythia intermedia*, *Acasia dealbata* and *Cytitus laburnum* have remarkable properties.

Table 2: Some properties of tree species accompanied to Bakirkoy Psychiatric Hospital Garden vegetation

Parcel	**Vitality**	**Habitus**	**Tending**	**Quality**	**Protection zone**	**Number in hectare**
1A	good	medium	Dry pruning of the lower branches, dilution of the weak growth and degenerate trees	Mature fully enclosed woodland	1	400
1B	weak	medium	Dry pruning of the lower branches, dilution of the weak growth and degenerate trees	Rare masses, weak growth woodland	2.	110
1C	good	good	-	Young plantation	3	90
2	good	medium	Dry pruning of the lower branches	Mature fully enclosed woodland	1	400
3A	good	good	Dry pruning of the lower branches	Young plantation rare masses ornamental plants	3	200
3B	good	weak	Dry pruning of the lower branches, dilution of the weak growth and degenerate trees	Mature woodland	1	400
4	good	good	Dry pruning	Young plantation	3	400
5	medium	medium	Dry pruning	Mature woodland suitable for recreation	1	250
6	medium	medium	Dry pruning	High protection degree woodland	2	180
7	good	medium	Dry pruning of the lower branches, dilution of the weak growth and degenerate trees	High protection degree woodland	1	360
8A	good	medium	Dry pruning of the lower branches, dilution of the weak growth and degenerate trees	Mature fully enclosed woodland	1	450
8B	good	good	-	Young plantation	1	
9	good	medium	Dry pruning	Mature woodland	2	250
10A	good	medium	-	Young plantation	3	200
10B	good	medium	Dry pruning of the lower branches, dilution of the weak growth and degenerate trees	Mature fully enclosed woodland	1	400
11A	good	medium	-	Rare masses woodland	1	170
11B	good	medium	Selective dilution	Young plantation	3	200
12	good	good	Dry pruning, Selective dilution	Mature woodland	2	300
13	good	medium	Dry pruning, Selective dilution	Irregular distribution woodland	2	250
14	good	good	Pruning	Young plantation	3	320
15A	good	good	-	Irregular distribution rare masses woodland	2	120
15B	good	medium	Dry pruning of the lower branches, dilution of the weak growth and degenerate trees	Mature fully enclosed woodland	1	400
15C	good	medium	Pruning , Selective dilution	Masses rare woodland	1	360

Table 2: Continued

Parcel	Vitality	Habitus	Tending	Quality	Protection zone	Number in hectare
16A	good	good	Pruning	Young plantation	3	220
16B	good	medium	Dry pruning	Mixed young and mature woodland	2	160
16C	good	medium	Dry pruning of the lower branches, dilution of the weak growth and degenerate trees	Mature rare woodland	1	400
17	good	good	Dry pruning	High protection degree woodland	1	250
18A	good	good	-	Rare masses woodland	2	
18B	medium	weak	Selective dilution	Young plantation	3	320
19	good	medium	Dry pruning, Selective dilution	Young and rare masses woodland	2	100
20A	good	medium	Dry pruning of the lower branches, dilution of the weak growth and degenerate trees	Mature fully enclosed woodland	1	400
20B	medium	medium	Pruning	Mixed young and mature rare masses woodland	2	100
21 A	good	weak	Dry pruning , Selective dilution (10-20%)	Mature fully enclosed woodland	1	400
21 B	weak	weak	Dry pruning , removal of dry wood	Mixed young and mature rare masseswoodland	2	120

In healing gardens, there should be medicinal and aromatic plant gardens with *Aesculus hippocastanum* and palm trees which have a sound with their leafs. So that, a sound garden can be installed in the healing garden.

Healing gardens will be placed in inner gardens and the gardens which is enclosed by buildings in first protection degree.

d. Actual development areas: This area has young dense or rare trees together with some mature trees plantation. They should be protected as second importance level. Blue zone

Exist planting texture has significance and properties which are required to assessment. Primarily it is the first important example for approach to organization of the republic era urban plantation. So in this area planting works should be considered as regarded to republic era planting design approach. It is important that the new planting design approach should not be dominant than Republic era planting design.

When selecting plant materials, research which particular species might have special sacred or evocative meanings for the cultural and age groups being served. It should be chosen plants that engage all the senses. It should be used a variety of textures, scents, colors, as well as plants that make pleasant sounds as wind rustles their leaves. Providing seasonal interest allows people to connect with the cycle of nature. It should be avoided thorny or toxic plants, especially in gardens used by children or people with certain psychological disorders. Incorporate elements that will attract wildlife including berry-producing shrubs, birdbaths and bird feeders. It should be avoided plants that attract large numbers of bees or undesirable insects (Anonymous 2015c).

Vapaa (2002) suggested plant types for the garden included evergreen and shade trees, tall ornamental grasses, clumping bamboo in containers, and hostas. The plants selected tended to be part of a varied green palette. Some use of flowers was also desired but was less important than foliage (Vapaa, 2002).

4.2. Historical and cultural value

According to Ahunbay (2009), archaeologists, art historians, architects and planners should study together for determine, dating and based on severity level of layers of different cultures which have come from ancient times to the present day at Istanbul. According to this study, as is mentioned at the Florance Charter that historical, cultural and archeological areas should protect with their environment, landscape architectures, biologists and arborists should be in the study group. Diversification of expert group can provide wide perspective to protection concept at the developing country like Turkey for sustainable and holistic protection approach.

Figure 18. The land-use map of the research area.

According to Florance Charter the preservation of historic gardens depends on their identification and listing. They require several kinds of action, namely maintenance, conservation and restoration. In certain cases, reconstruction may be recommended. The authenticity of a historic garden depends as much on the design and scale of its various parts as on its decorative features and on the choice of plant or inorganic materials adopted for each of its parts.

In Turkey, according to currently valid Article of Law No 2683, the buildings which have made prior 1900 are scope of the protection. 20th century's building can be protected on the understanding that it should be belong to important architect or representative to important architectural trend or part of an array of structures. It should be considered the historical buildings at the remediation studies of Bakirkoy Hospital and its environment. The historical buildings of Bakirkoy Hospital has distinct architecture and design characteristics because of them the renovation projects of buildings should be maintain architecture style of the era of buildings construction time.

According to Wang (2011) the real historical properties should be protected, rebuilt, and renovated, instead of protecting their replicas. The requirement of integrity implies that historical buildings and all other elements of the landscape, including roads, lanes, yard walls, bridges, streams, banks, and even old trees, should be protected. The requirement of functional continuity connotes that the local residents can live according to their own will, the original social function of the historical urban areas should remain undisturbed, and the local vitality should be reinforced.

The occurring of the hospital identity of the remediation works very important. Not only solving of the architectural problem is important but also it should be established to connection between the architectural structures and landscape. The other important subject is to deliver to the volume, sites and lines in the balance and to create harmony with the material, color and light changes. In this way it is provided to perception of site and it is created functional, esthetic, and reasonable site organization. The using new material in the buildings and their environment is not reflecting that Republic era. It should be used marble, travertine, natural stone or brick for the paths, walls and build facade. Some compressed surface is good for paths in the planting areas. Garden furniture (banks, lights, pools and sign board) should reflect to Republic era, too.

Restoration, like any art, seeks a greater understanding of existence, which tends to deepen our appreciation, gratitude, and humility, salubrious states of mind that are less fringe benefits than compelling requisites for further work. Moreover, the art of restoration is finely balanced between mind and body, thought and sweat (Nilsen, 1991).

For some people an example of a healing space includes symbolic structures designed to fit into the landscape such as the installation of a small chapel in the case of one West Virginia resident (Vapaa, 2002). The use of sculpture was also highlighted in one survey which was consistent with the intentions of the designers (Vapaa, 2002). Sculpture was carefully chosen to relate to the garden as well as encourage contemplative meditation (Anderson and Hicks, 1990).

The imitation sculpture of François-Auguste-René Rodin's "Thinker" which did by Kemal Künmat is become integrated with garden. This sculpture is really important landmark for the Bakirkoy hospital garden.

That sculpture recall to mental illness in Turkey. A lot of city tales are about this sculpture. An sculpture workshop can be installed into the hospital garden so that therapy with art can be helpful for patients.

Contact with and access to nature has potential benefits for both physical and mental health (Frumkin, 2003), aiding in recovery after surgery (Ulrich, 1984), stress reduction in children (Wells and Evans, 2003) and cognitive functioning (Shibata and Suzuki, 2002). Bakirkoy hospital gardens like the other healing gardens can have impact on two levels: (1) the direct role the environment may play in the recovery process and (2) the indirect effect of environment in enhancing quality of care and helping patients feel restored (Miles 1992, Mazumdar and Mazumdar, 2012).

5. CONCLUSIONS AND RECOMMENDATIONS

Historical hospital buildings and their green environments are key elements in the protection of the history and culture of a Bakirkoy in Istanbul. Bakirkoy Hospital Garden is the only green space in Atakoy Istanbul people may breathe in the nature. For protection of this area does not only involve planning, but also a comprehensive endeavor. The methods and policies for the protection of hospital and its environment should be given special attention. Aside from the physical structures, the culture and cultural diversity in hospital garden should be protected as well. In other words, their functions should not be undermined, and the living environment should be improved, which are essential for the protection of historical hospital garden. The protection of historical hospital areas should not be confused with the development of real estate, and the profits of investments should not be the major concern.

The historical Bakirkoy Hospital garden is an example of how appropriate initial sustainable design can provide important areas for biological conservation within urban-settlement areas.

Supported from our findings, the following recommendations for future garden design and restoration of historic garden can be made:

1. The existing relief and soil conditions as well as existing habitats must be integrated in a garden design or during garden restoration projects, instead of starting from scratch.
2. The majority of seeds and plants which are used within the park should be of native origin to support native biodiversity as well as regional identity.
3. In contrast non-native ornamental species should be only used in small numbers to set accents, not as major garden components.
4. The use of non-native species already known or suspected as environmental weeds must be avoided.
5. Low intensity management of the garden, especially of their natural or semi-natural habitats, can support essential regional biodiversity.

For future restoration and reconstruction projects planners should know the location of all rare and endangered plant species and they should take steps to avoid or minimize damage to these species during any construction works.

Bakirkoy Psychiatric Hospital garden of Istanbul accounted for a dynamic and high-relevance ecological succession gradient of vegetation in the context of an urban landscape. An upward trend in vegetation complexity along the areas mediated by a succession of distinctive urban vegetation complexes was general. Human disturbance on historical gardens appeared to be mainly associated with land-use systems next to the garden, which depends on landscape features. In Istanbul urban environments, where the healing garden give refuge to a great variety of distinctive plants and animals, the protection of the few existing well-preserved green area and the need for restoration of highly altered green area ones becomes an essential priority to long-term maintaining biodiversity. The protecting should be done not only historical structure and sites but also the green areas, plants and animals. It should be considered the temporary or permanent structure and areas by the holistic approaches. By the way of reusing resources economically, it is possible to protect the sign of the past and to provide with identity network. It should not forget that the means of the protection in the modern approaches is the use sensible.

The extensive method developed in this study, based on a landscape perspective, would be easily applicable to other large areas to assess the effects of human disturbance on historical garden as well as the factors involved.

To sustain conservation usage balance of Bakirkoy Hospital Garden, to take out hospital and its surrounding from risk area, to protect from urbanization and harmful effects of urban development are important issues about hospital garden. Because of them scientific, legal, management, cultural and economic dimensions of protection should be considered in a planning action. Protection should be above on political and economic considerations.

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Chapter 6

Urban Green Areas and Design Principles

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INTRODUCTION

The importance of cities has increased significantly over the centuries; however, the transition from rural life to urban civilization led both social and environmental impacts (Woolley, 2003). This situation has caused urban landscape to be in a constant state of change and transformation. Roger et al. (1999) described the important factors which influence the change of urban landscape by the following three factors (cited in Thompson, 2002):

- The technical revolution, focused on information technology and changed from global to local networks connecting people;
- The ecological threat, with its implications for the importance of sustainable development;
- The social transformation, with life patterns reflecting increasing life expectancy and new lifestyle choices.

The growth of urban populations and associated industrialization has resulted in a range of detrimental and often negative outcomes for mankind (Woolley, 2003). The environmental problems caused by the change of urban landscape are summarized as air and water pollution, waste materials, noise, the consumption of natural areas for urban development, deterioration in the quality of urban life and the decrease in the urban landscape (Woolley, 2003).

Urban green areas are highly valued by urban and landscape designers for their contribution to the quality of life in cities. In many aspects, nature plays a crucial role in everyday life of people. Natural environments fascinate human beings (Kaplan, 1983; Kaplan, 1977; Kaplan & Talbot, 1983). "Access to natural open spaces is a central value in modern society". Moreover, urban green areas are associated with personal and social meanings. They provide a context for social interaction; serve as tangible reminders of childhood and memories of community life, and offer "gateways" or opportunities for people to escape for a while from the stress of urban life (Burgess et al., 1988).

At the preliminary stage of this interaction, urban green areas that are close to the city-dwellers come on the scene. Urban green areas provide affordances for urban people to become closer to nature and enable them to contact with nature, these areas provide the sense for exploring of human nature (Kaplan & Kaplan, 1978). Consequently, urban green areas are one of the most important urban components that change the urban silhouette and affect the physical and psychological quality of life of

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the city-dweller. Therefore, their formation and the values they include have been differentiated and renovated according to the changing needs of the society. These spatial changes in urban green areas affect the mission and functions of the cities and the urban silhouette. Thus, the answers to the questions of what the meanings and values assumed by the urban green areas are and how they will be designed are important.

Urban Green Areas

Industrial Revolution and the widespread urbanization in the 19th century resulted in the loss of natural areas from the cities and losing the place of nature in daily life. The need for allocating more spaces to natural areas in cities has begun to be supported by this change, and the concept of "urban green area" has emerged as an important element of the cities (Özgüner, 2003). The first definition of urban green areas was made by American landscape architect Frederick Law Olmsted who was affected by the public-open space movement in England by the Boston Park System that was formed in the 19th century. Olmsted defined the approach of introducing the nature that begins with Central and Prospect Parks in New York City as the "lungs of the city" (Francis et al., 1984). In particular, the open spaces that could not respond to the recreational needs of the people living in the community buildings that were created after the Second World War led to make mention of urban green areas. After this period, in the 1970s, urban open spaces came to the forefront with green space features and led to the comprehensive definition of urban green areas by creating the landscape framework of the cities.

Figure 1. Urban green areas

Today, urban green areas are the areas that contribute to people from physical and mental aspects, where recreational needs are met, the community identity is strengthened and which are developed and organized by being considered along with the structure masses. Urban green areas are an important indicator of the quality of life of a city, and the green spaces designed in urban spaces characterized by social and spatial differences have an important potential as an equalizer (Wright Wendel et al., 2012). With these features, green spaces are one of the most important components of the whole constituting the urban areas for the continuation of the urban quality of life and ecological and social sustainability. Because green areas' structure the people's welfare, provide ecosystem services (climate regulation, preventing environmental pollutants, regulating the surface flows), create appropriate places for a healthy life where neighbours meet and the spirit of being community is strengthened, and promote resting and thinking about the nature (Chiesura, 2004; Lee & Maheswaran, 2011; Carrus et al., 2015;. Urban green areas have been included in various typologies with these comprehensive features they include. Green spaces can be classified in different ways according to usage patterns (active green spaces and passive green spaces), ecological function (historic gardens, greenbelts surrounding the city, agricultural areas and buffer greens)and recreational functions (parks, thematic parks and gardens, sports fields, playgrounds, natural and semi-natural areas, corridors) (Aydemir, 2004). This study includes the following typology which was developed by Dunnett, et al. (2002) and consisted of the combination of all classifications, and this typology is explained with examples in Table 1;

1. Recreational green areas: These kinds of green spaces are primarily designed for access to both visual comfort and recreational comfort. In particular, they consist of public places but also include private lands.

Figure 2. Recreational green areas

2. Functional green spaces: Some of these green spaces could be allocated for recreation and serve for city-dwellers for this purpose, however, their principal purpose is the function. The purpose of their use by the city-dwellers is the functions they have. Their basic functions include use for agriculture, horticulture, cemeteries, education and for other institutions.

3. Semi-natural green spaces: These kinds of green spaces consist of semi-natural living spaces. These living spaces are created by their transformation into new living spaces along with the improvement of the rural areas prior to being included in urban green areas and of the abandoned or degraded areas. All these habitats may or may not be accessible to the public, but they make a vital contribution to the urban landscape.

Table 1. Typology of urban green areas

MAIN TYPES OF GREEN AREAS			
ALL URBAN GREEN AREAS	**Amenity green areas**	**Recreation Green Area**	Parks and Gardens Informal Recreation Areas Outdoor Sports Areas Play Areas
		Incidental Green Area Space	Housing Green Space Other Incidental Space
		Private Green Area	Domestic Gardens
	Functional green area	**Productive Green Area**	Remnant Farmland City Farms Allotments
		Burial Grounds	Cemeteries Churchyards
		Institutional Grounds	School Grounds Other Institutional Grounds
	Semi-natural habitats	**Wetland**	Open/Running Water Marsh, Fen
		Woodland	Deciduous woodland Coniferous woodland Mixed woodland
		Other Habitats	Moor/Heath Grassland Disturbed Ground
	Linear Green Areas		River and Canal Banks Transport Corridors (road, rail, cycleways and walking routes) Other linear features (e.g. cliffs)

4. Linear green spaces: These green spaces are defined by their linear features; including rivers and streams as well as transportation routes (roads, railways). Although significant portions of linear green spaces are planned for the recreational purpose and nature conservation, some of them are also planned to include both features.

Urban green areas serve for common purposes although they are defined by different types. They provide users shadow physical comfort such as clean air and resting places, and formal or informal social interactions such as a combination of different social groups and traditions and opportunities regarding the cultural experience in urban areas (Lawton, 2007). Urban green areas are the places where community life is taken place. In these places celebrations takes place, children develop skills, seasons are recognized and the cultures are merged. In these places friends meet each other and the social and economic exchanges take place (Project for Public Space, 2000). These roles, played by urban green areas, provide various benefits to the life of city-dwellers and the also to sustainability of cities. These benefits are classified as:

- The benefits to mental (Grahn & Stigsdotter, 2010; Mackay and Neill, 2010;

Barton and Pretty, 2010) and physical health (De Vries and Verheij, 2003; Mackay and Neill, 2010)

- Economical benefits (Jim and Chen, 2006; Tajima, 2003)
- Social benefits (Dwyer et al., 1991; Jim & Chen, 2009; Kamierczak, 2013)
- Environmental benefits (Chiesura, 2004; Gidlöf-Gunnarsson and Öhrström, 2007; Niemelä, 2014).

Benefits of Urban Green Areas

Along with the ongoing urbanization movement, urban spaces are expanded without thinking the green space development, and rural lands are transformed into built up areas (Kabisch et al., 2015). Therefore, while urban green areas were recreative and symbolic places where people provide their food (Groening & Bulmahn, 1989) in the past, today they are considered as a way to ensure the individual's relation with the nature, to bring the natural life into the city and to make cities more livable. Urban green areas have been the most important components of the city that mean a lot as spaces where people have existed in every moment of life by transforming sometimes into landscapes which are just watched for the city-dwellers, sometimes into parks where the life is shared and people get rid of the stress of daily life, sometimes into shelter for children, and into playgrounds. This situation has made the benefits provided by urban green areas to city-dwellers an important issue, and the benefits provided by green areas have been explained by various classifications. Mostyn (1979) defined the benefits of being in nature for people as *emotional* (the comfort felt by being away from the city, opportunities to identify with the nature, the feeling of freedom, a peaceful shelter to compensate emotions, self-esteem and the sense of achievement), *intellectual* (investigating the nature, obtaining information about the vegetation cover and animal diversity, learning the local history and gaining new skills), *social* (better recognition of people, enjoying the team and community spirit, becoming more responsible citizens) and *physical* (it appeals to the senses, feeling energetic, a safe place to do exercises and play games) benefits (Özgüner, 2004; Kendle & Forbes 1997; Beer, 1990). Dunnett et al. (2002) defined the benefits of urban green areas as *social* (healthy life, education and socialization), *environmental* (contribution to biodiversity, contribution to landscape and cultural heritage, reduction noise level, improvement of the air quality and climate) and *economical* (attracting the inward investment, protecting the businesses, supporting tourism to create employment opportunities and increasing value of the surrounding property) benefits. Byrne & Sipe 2010) defined the benefits of urban green areas as *ecological* (protecting biodiversity and living spaces, regulating temperature, noise reduction and air filtration), *social* (improving the physiological and psychological health, contribution to child development, providing social interaction) and *economical* (promoting to tourism, contribution to the economy by lowering the temperature and reducing pollution) benefits. Within the scope of this study, the benefits of urban green areas for people are grouped as the following;

1. Health benefits

Urban green areas create a feeling of satisfaction in the individual along with escaping from the difficulties of the living environments and the active participation into nature by ensuring people working in a busy schedule to get rid of their daily fatigue and noise of the city. To touch, see, hear and smell the elements that constitute the natural world can make people get rid of their thoughts, refresh people, and provide them with a sense of peace and calmness (Kaplan, 1983). Therefore, the presence of urban green areas is an important element for the quality of life of the city-dweller. They serve for their users as "*green sports facilities*" (Orr et al., 2014), and the activities they contain are grouped as free activity (walking, exercising in natural areas) and organized activity (more formal, regular physical activities, organized sports) (Wheater et al., 2007).

Along with their physical activity opportunities, urban green areas positively affect the physiological and psychological health of the city-dwellers. Because going to natural areas improves the general health perception of the individual (Byrne & Sipe, 2010), increases the physical activity levels (Gidlöf- Gunnarsson & Öhrström, 2007; Bertrama & Rehdanz, 2015) and also contributes to the individual's future health by the physical activity opportunities (Orr et al., 2014). Otherwise, poor quality urban areas lacking green areas indirectly affect the physical health of the individuals of city-dwellers; and the negative emotions caused by mental stress lead to cardiovascular diseases by increasing the blood pressure of the individual and negatively affect the mental health of the individual due to asthma, cancer and metabolic disorders (Lawton, 2007).

Benefits of urban green areas to physiological health:

- Accelerate recovering from various types of cancer (Byrne & Sipe, 2010),
- Decrease the chronic health risks such as nervous system damage and heavy metal poisoning (Wright, 2011),
- Allow people to fight against obesity and heart disease caused by sedentary lifestyle (Byrne & Sipe, 2010),
- Improve the general state of health (De Vries et al., 2003; Maas et al., 2006),
- Prolong the life span (Takano et al., 2002; Schipperijn et al.,2010) and
- Lower the blood pressure (Qin et al., 2013).

Benefits of urban green areas to psychological health:

The effects of urban green areas on psychological health can be classified under five main headings (Rohde & Kendle, 1994):

- Emotional; they decrease the stress, increase individual's positive feelings about himself (Ulrich et al., 1991; Grahn & Stigsdotter, 2003; Ulrich, 2006; Nielsen & Hansen, 2007; Byrne & Sipe, 2010), positively affect the individual's experiences that renew and offer health (Hartig et al., 2003; Van den Berg et al., 2010).
- Cognitive; they reduce mental fatigue and refresh the attention (Kaplan & Kaplan, 1989),
- Developmental; they support children's healthy development by encouraging a higher level of mental activity in them (Özgüner, 2003).
- Behavioral; they increase the exploratory and adventurous attitude supporting or forming the self-esteem.
- Social; they facilitate natural environment interaction, promote communication between social boundaries and even provide a wider social responsibility in some cases.

2. Economical benefits

Benefits of urban green areas to the city;

- Creation of job opportunities, providing services to local, regional people and tourists in green areas, employment of people responsible for the maintenance of these areas (Dunnett et al., 2002; Wright, 2011),

- Creation of general economic impacts; green areas attract investments by increasing the quality of the areas where they exist, increase the values of those areas in particular, increase the values of the real estates in their surroundings and support the local economies (Woolley, 2003; Byrne & Sipe, 2010; Wright, 2011; Jim & Chen, 2006; Kabisch et al., 2015),
- The well planned and designed green areas that increase attractiveness of the city contribute to tourism and thus economy (Dunnett et al., 2002; Byrne & Sipe, 2010),
- The presence of green areas decreases the heating and cooling costs of the buildings by their climate balancing features and reduces the negative effects caused by them (Byrne & Sipe, 2010).

3. Social benefits

Green areas have two functions in terms of social life: green areas provide people with the opportunity to feel the comfort outside their living spaces and thus make them feel that they are associated with a greater social system. These areas allow an individual to be alone as well as allowing him to share life with many people; and even they sometimes include places that will allow an individual to be alone in the crowds (Thompson, 2002; Jim & Chen, 2009; Byrne & Sipe, 2010). Secondly, green areas serve as the gathering place for people to communicate with each other; people become acquainted with others, young people get rid of the heavy responsibilities even just for a while (Burgess et al., 1988). The studies carried out indicate that the relationships with people, spaces and events contribute to the feelings of being familiar with the community and belonging to the community. The spaces that help to shape community's attitudes and to develop the identity of the community and that provide continuity from the past to present become important for neighbors and obtain a social value and meaning (Chang, 2002; Mehta, 2007; Project for Public Space, 2000). They strengthen the sense of belonging, the sense of being a community and the neighborhoods by gathering together all sections of the community in urban green areas regardless of social status (Bertram & Rehdanz, 2015; Kabisch, 2015; Barrera et al., 2016). Thus, urban green areas can also be useful for social welfare by increasing the sense of social cohesion and identity (Bertram & Rehdanz, 2015).

Urban green areas are shared with strangers, and thus people with different religions, cultural and political values are existed together. Along with all these features, green areas serve a function which is important for the self-definition of the community.

Social benefits provided by the urban green areas:

- They play a "social solidarity-enhancing" role by creating a kind of living space for all sections of the community (Wheater et al., 2007).
- Green areas structure the social participation because they are free of charge and accessible to everyone (Byrne & Sipe, 2010), and they increase the social interactions and values by supporting the interpersonal communication and interaction (Özgüner, 2004) through removing the boundaries between social classes (Jim & Chen, 2009).
- Green areas provide a neutral ground which is available to all sections of the

community and can become the focus of community spirit by numerous and various possibilities offered for social interaction (Byrne & Sipe, 2010; Bertram & Rehdanz, 2015; Kabisch, 2015; Barrera et al., 2016)

- Green areas strengthen the integration of the community and the neighborhoods (Barrera et al., 2016)
- Green areas structure the child development by providing children with the opportunity to have energetic playgrounds based on imagination with the facilities in the outer space, and ensure that children interact with adults (Woolley, 2003). This situation positively affects the children's social and cognitive development, teaches them the social values and coping with difficulties, and gives them physical and mental health (Wheater et al., 2007). Consequently, urban green areas allow children to be included in the community as individuals who can establish healthy and social relationships.

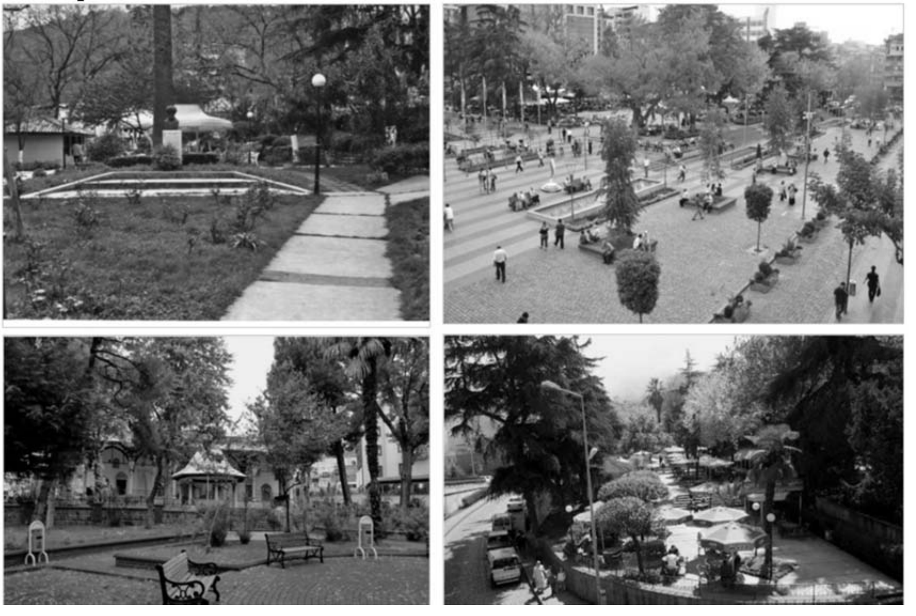

Figure 3. Socialization affordances of urban green areas

4. Environmental benefits

The environmental benefits of urban green areas are associated with features of climate and environmental improvement (Woolley, 2003), providing opportunities for habitats (Woolley, 2003), improving aesthetic appearance (McCormack et al., 2010; Sugiyama et al., 2010), improving the urban landscape and the city's livability.

Climate and environmental improvement:

- They play a role in improving the urban air quality, improving the urban climate and decreasing the noise level (Gidlöf- Gunnarsson & Öhrström, 2007).
- Urban green areas create cool urban spaces and mitigate the urban heat island effect (Lawton, 2007).
- The plants that constitute the urban green areas reduce the air pollution by seizing the particles, absorbing the heavy metals and polluting gasses and assuming the task of filtering air (Dunnett et al., 2002; Lawton, 2007).

• They reduce the negative effect of urban area on natural water sources by ensuring the absorption and retention of rain waters, and they control the water regime (Chiesura, 2004; Niemelä, 2014).

Providing opportunities for habitats:

• Green areas play an important role in the protection of natural habitats with the natural life corridors and urban forests they create. Thus, urban green areas ensure the continuity of the species and the continuity of the city's biodiversity by creating a habitat for the presence of natural plants and animals (De La Barreraa et al., 2016; Dunnett et al., 2002).

Improving aesthetic appearance:

The aesthetic quality of an environment may affect the experience-welfare in this environment, and the sense of well-being (Nasar, 1988). Therefore, the sensations and visual information that the individual receives from the environment are extremely important for aesthetic evaluations. The rapid urban development has resulted in urban appearances consisting of many building blocks. The cold and ugly effects caused by these buildings are embellished with the natural elements (tree, water, landform, grass surfaces...) that the green areas contain. Urban green areas arouse a sense of mystery in watchers by an enriched landscape pattern that is created with natural elements they contain (Kaplan & Kaplan, 1989). Consequently, the perceptual information obtained from the surrounding is also enriched by enriching the watcher's field of view. Well planned green areas ensure individuals experience both a large space and a space that contains a depth. The damages to the aesthetic perception by the mass development in our day (Nohl, 2001) can be improved by successfully designed urban green areas.

Figure 4. Natural areas in urban green spaces

Aesthetic contributions provided by urban green areas to the city:

They create a sense of space and perspective around the buildings (Wheater, 2007).

• Green areas increase the aesthetic quality of the urban environment with their physical functions such as the regulation of the urban texture and the stabilization of density, and the natural landscape components they contain (Dunnet et al., 2002).

• They bring identity and character to the city (Aydemir, 2004).

• Green areas soften the monotonous structure of the city. They balance the measurement contrast between nature and human (Aydemir, 2004) and contribute to the urban aesthetics and the psychology of the city-dwellers.

Improving the urban landscape and the city's livability:

- Urban green areas can provide the sustainability of the aesthetics and naturalness of the urban landscape by softening the city's large firm ground.
- The fact that the crowded cities full of high-rise buildings are dark and shadowy deprives the city of air and light. This situation not only affects the quality of social life but also the atmosphere and livability of the city as a whole (Chang, 2002). Urban green areas allow cities to breathe and make them livable by creating definable spaces in cities.
- The trees, which are the vertical elements of urban green areas, give color to urban landscape by their seasonal changes and add texture by their leaves, and they also bring a depth and sense of wonder to the urban space by creating vistas. Therefore, the urban parks and urban green areas which are included in the formation of green areas in cities have a great importance for the quality of life of the urbanized community. Studies have shown that the presence of natural values (urban parks, forests, and green bands etc.) and the components of these (water, plants etc.) contribute to the quality of life in cities (Chiesura, 2004).
- Urban green areas provide people living in the city with social and physical activity opportunities by the open spaces created by them in the city (Wan & Shen, 2015). These areas that bring people together for walking, resting, playing and watching the environment (Halprin, 1981; Wright Wendel et al., 2012) increase the city's livability (Woolley 2003).
- The landmarks and historical places which are the important elements of the urban identity disappear among the high-rise buildings that define the urban silhouette. Urban green areas create environmental images for individuals and strengthen the spatial perception by providing the perception of the landmarks and historical places. They ensure the transfer of historical experiences in those spaces to people, improve the users' mental images related to that space, create the feeling of confidence and familiarity related to that space in people, and therefore make the city more livable for the city-dwellers (Yılmaz, 2009).

Design of Urban Green Areas

Nasar (1988) reported that people pay attention to the visual quality of their surroundings, and designers will more successfully design environments which are in better conformity with the preferences and activities of users by knowing the features of the relationship between human emotion and visual environment. This will also contribute to the development of the quality of life over time because the aesthetic quality of an environment may affect the experience-welfare in this environment, and the sense of well-being. This situation indicates that people will be drawn into an environment they like, and they will stay away from an unsatisfactory environment (Nasar, 1988). Kaplan (1987) made a similar remark regarding the preference and defined the preference as the tendency to make choices that keep individuals out of unsuitable environments and direct them to the desired one. So, it is very important to create urban green areas with high levels of use that are preferred by the people and offer a vivacious appearance by various events and users. This is the only way to design satisfactory green areas that attract people. The urban green areas the physical, psychological and economic contributions of which are extremely important for the city and city-dwellers will lose all these contributions and their values if they do not function successfully. In this context, the answers to the questions of “why do they show a tendency to prefer some urban green areas to others” and how do people make a distinction between urban green areas” are very important. This answer is implicit in revealing how people experience urban green areas and why they prefer them. Consequently, how the design of green areas preferred by people will be completed and will be included in this process is also very important.

Figure 5. Aesthetical contributions of urban green areas to cityscape

Which urban green areas are preferred by people?

Multidirectional investigations addressing issues such as what criteria for the design of urban green areas should be, and the types of users and usages have been carried out, an attempt to determine the features of the preferred spaces, the interactions with the environment and the relationships of the people in those spaces have been made, and new design proposals have been developed in accordance with the findings. Regarding the studies in which how the use and thus the preference of urban green areas are increased is revealed;

- Beer (1994) reported the important characters that define the environments preferred by people as complexity-diversity, mystery, legibility and coherence.
- Naturalness is a feature that positively affects the preference in the environmental preference and evaluation literature (Hartig, 1993; Kaplan & Kaplan, 1989; Herzog, 1989; Schroeder, 1987; Ulrich, 1983; Ode et al., 2009).
- Depth is a dominant feature that affects the preference decision of the landscapes (Ulrich, 1983).
- The general principles to guide decisions related to preference were investigated in the studies of psychological theory and environmental aesthetics, and four characteristics that affect preference were suggested: naturalness, complexity, order and legibility (Nasar, 1994; Kaplan & Kaplan, 1989; Kaplan & Kaplan, 1982).
- Landscape preference is characterized by four variables: complexity (Hagerhall et al., 2004), mystery (Herzog & Bryce, 2007; Nasar & Cubukcu 2011), legibility (Herzog & Leverich, 2003) and coherence. (Kaplan & Kaplan 1989; Kaplan et al., 1998; Kaplan et al., 1972).
- Diversity positively affects the landscape preference (De La Fuente De Val et al., 2006).

When the results of studies in the literature are evaluated, "naturalness, mystery, legibility, complexity (diversity), coherence (order) and depth" can be evaluated as the features that will increase the preference of urban green areas. These features are defined as follows (Table 2):

This information obtained from the literature has shown that the features of "naturalness, mystery, legibility, complexity, coherence and depth" are very important in increasing the preference of urban green areas around us. These features are also extremely important to generate urban green areas with high levels of preference that evoke a positive psychological effect on the individual. Therefore, the study is built on how the features of "naturalness, mystery, depth" will be projected to design.

Table 2. Features defining the preference (Kaplan & Kaplan, 1989; Kaplan et al., 1998; Herzog & Leverich, 2003; Yılmaz, 2008)

Legibility	Legibility is the ease of classifying and processing the elements that constitute a view or individual's ease of discovering the environment without getting lost. The legibility of the space is associated with the sense of order and clarity it contains.
Complexity	Complexity is the diversity of elements that constitute a view and having enough knowledge that will keep individual interested and concerned. Diversity stimulates the urge to discover.
Mystery	The mystery is a view's potential to provide new information or degree to arouse curiosity and provide more information. It is necessary to create fragmental shadings or hidden areas to arouse the individual's curiosity for an area to create a sense of mysteriousness.
Coherence	Coherence is the orderliness or organization level of the elements that constitute a view because the organization of a coherent space is clear. The different areas that constitute the space should be perceived explicitly and clearly. People can easily distinguish these different areas, and this also paves the way for understanding or making sense of the space.
Naturalness	Naturalness is related to human-made elements, naturalness increases as the human-made elements decrease. Plants and the continuity in topography strengthen the naturalness.
Depth	Depth is a variable which is associated with visual perception measurements in the landscape. In a view, the transparency provided by overlapping forms and the perception of the element that covers behind the element that is covered on the front ensure the in depth-perception of the space.

How to design urban green areas?

How can the features of "naturalness, mystery, depth" obtained from preference studies be projected to the design of urban green areas? By what combination of rules with space components (plants, topography and water) can a designer make the feel of the impact that he wants to evoke? In this chapter, answers to these questions were sought and the following features were obtained by carrying out evaluations for the design of urban green areas. They were evaluated by subheadings (Table 3).

Table 3. Characteristics regarding the features defining the preference

Features defining the preference	Characteristics
Mystery	• Curved roads • Partial closeness • Depth
Naturalness	• Continuity in the formation of the area plastics • Continuity in plant texture
Depth	• Transparency (transparency provided by the green texture) • Covering (overlapping forms in green texture and area plastics)

It was aimed to give clues to designers to strengthen the designs for increasing the "feature of mystery, naturalness and depth", and the following design decisions were achieved with the help of the relevant literature (Table 4);

Table 4. Design decisions regarding the features defining the preference

Feature	Design Decisions
Spatial factors that positively affect the space's "feature of naturalness" (Figure 6)	1. Plants will be green and green tone 2. The more natural perception of the space is provided by the colors, forms and sizes of the plants and the harmonic relations in the formation of the area plastics. 3. Creation of texture unity on the plant and ground surface 4. Circular and curved forms 5. Naturalness increases as the human-made elements decrease (Zube et al., 1983)
Spatial factors that positively affect the space's "feature of mystery" (Figure 7)	1. The ground surfaces; changeable and rough textures disrupt the depth continuity of surfaces and decrease the preference level of spaces. Therefore, homogeneous and soft textures were used on ground surfaces because this gives a sense of mystery to spaces and increases the preference level as it provides the observer with the opportunity of discovering and moving (Hartig, 1993). 2. Obtaining a mystery in an environment is strengthened by the features such as curved roads, partial closeness created by the leaves, linear perspective and width (Kent, 1993; Kaplan & Kaplan, 1989).
Spatial factors that positively affect the space's "feature of depth" (Figure 8)	1. The covering between the surfaces strengthens the feature of depth in the space when it is performed by making use of textural gradation of the surfaces (Gibson, 1986; Ulrich, 1983). 2. Plants and topography cover each other without impairing the perception of their forms, 3. Ensuring the visibility of the background using light-textured plants, and 4. The use of dark and hard-textured plants in the foreground and the use of light-colored and light-textured plants in the background strengthen the depth feature.

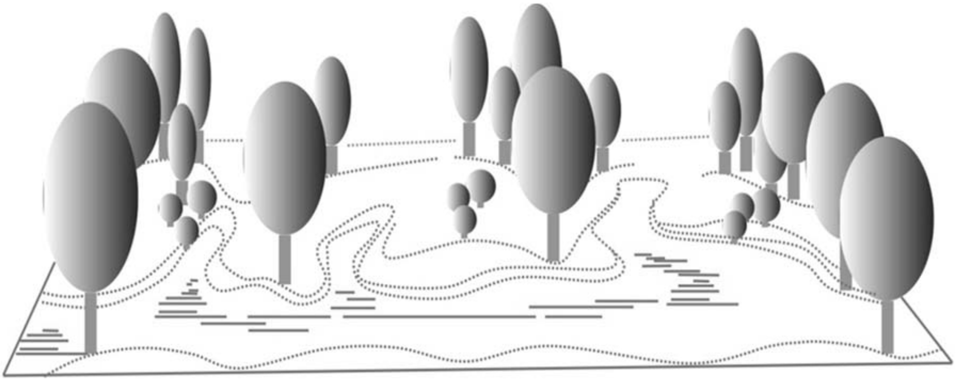

Figure 6. Schematic representation of naturalness of space

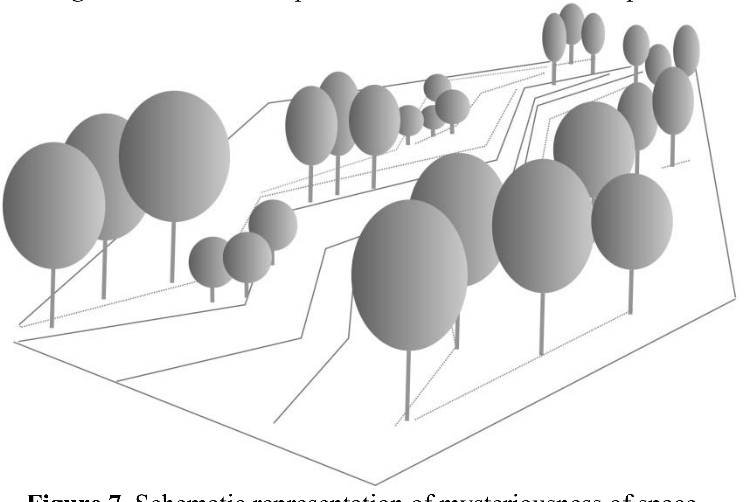

Figure 7. Schematic representation of mysteriousness of space

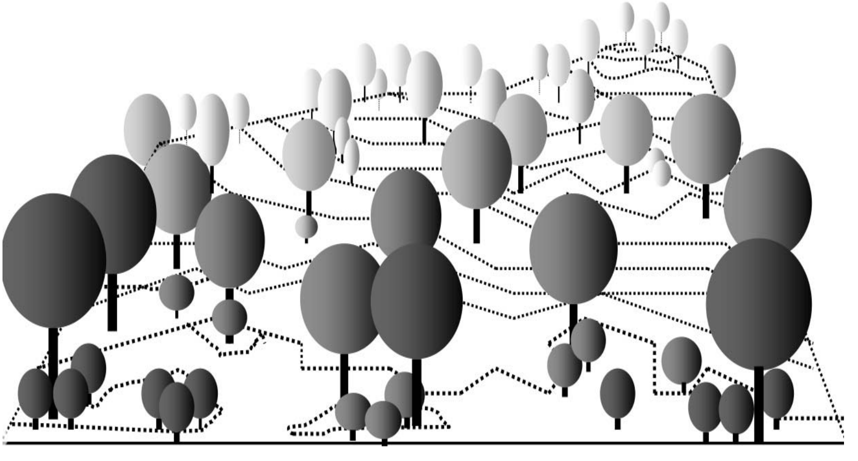

Figure 8. Schematic representation of depth of space

CONCLUSION

Urban green areas provide numerous benefits for those living in the city; they clear the air as the city's lungs, and they mean water and soil for the natural areas in the city (Gupta et al., 2012). They are the areas where the community sense of being is developed by establishing a connection between the different parts of the city (Thompson, 2002), where people ensure the social integration (Dwyer et al., 1991; Kamierczak, 2013), and where the opportunities for mental healing, knowledge acquisition, physical exercise, and comfort are provided (Kaplan & Kaplan 1982). In other words, they are important as the social focal points where social needs are met such as the fact that people from different cultures and socioeconomic classes come together, become acquainted with each other and share the life, and as the places where those living in the city merge with nature.

In order to increase the quality of life for the people living and working under stress in cities, urban green areas are needed. Urban green areas are significant for daily lives of everyone including old people, children, workers and unemployed people living in the city because these people make use of these places and give meaning to them in different times and for different purposes. Urban green areas sometimes become the places where we come together with our friends, sometimes become playgrounds in which children can run and play, and sometimes become a scene where we can look from our house or office. However, they certainly have a meaning and function for us. Whereas, these urban green areas which become more important day by day up to now, are the places that are essential for us especially in our country. In order to bring nature and natural places that are ignored because of Industrial Revolution back to the city, models related to design approaches of open urban spaces should be produced by the planners and designers. Otherwise, urban spaces that are not designed well will turn into the places which citizens do not use, thus causing economical loss and communication and social interaction break down as they cannot meet the needs of people.

Therefore, within the scope of this study, some design proposals that are intended to be a guide for the designers of urban green areas have been suggested. Thus, it has been aimed to give clues of creating a preferable and livable urban space for the city-dweller where they gain satisfaction experience. With the help of these clues, "the feeling of integrating with nature" can be provided in urban green areas which are replete with trees and flowers which cannot otherwise be felt among buildings.

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Chapter 7

Agricultural Landscape Values of Turkey

Nilgün GÜNEROĞLU*, Makbulenur BEKAR**

INTRODUCTION

Agriculture is the most effective determinant that shaping the life style during the transition from nomadic to sedentary culture. Because, thousand years ago the human beings decided to settle and produce their own food sources by growing crops and farming instead of moving from one place to another. Settling in a definite place extremely eased the daily life of the clans by providing more comfortable living standarts. Major settlements areas were preferably chosen nearby water sources to meet the water demand for surviving and growing crops. Realizing the higher living quality, the small groups started increasing in numbers by higher breeding rates to form large populations. Therefore, relatively small crop fields became inadequate to meet the daily nutrition demand of the big human populations. As a result primitive and relatively small crop fields evolved to large land parcels to start more organized agricultural practices. Moreover, foundations of today's big cities were constructed on those old settlements areas built up in close vicinity of the agricultural fields. After modernization era, the agricultural areas were even expanded more and more to meet not only domestic but also international food demands of world population. Today approximately 37% of the total 13 billion hectare of earth surface which is equal to 5 billion hectares is allocated as agricultural area. The 1.5 billion hectares of the total land is used for field crops, the area allocated to perennial grow is also around 1.5 billion hectares and the remaining part is classified as grass and pasture land (OKP, 2014). China is leading country in terms of total arable land with 520 thousand hectares and Turkey is ranked as 30th with totally 39 hectares of agricultural land (RDT, 2014). Besides being ecosystem connection zones between rural and urban regions, agricultural lands have great landscape potential to be attraction points as part of cultural landscapes. Agricultural landscapes that consist of agricultural fields and nearby rural settlements are sub-component of rural landscapes (Mastronardi et al., 2015). Agricultural fields are not only zones used for income or feeding but also areas providing important landscape values such as ecologic balance, aesthetic and cultural services (Parris, 2004). Therefore, agricultural lands should be protected, promoted to ensure and transfer their sustainability for the next generations. Unfortunately, agricultural fields are not given necessary concern due to the urban expansion which guarantees higher profit in short term but may turn a burden and trouble in a longterm perspective. As result, agricultural land alteration and fragmentation are increasing day by day to make more money. The situation is more severe in developing countries like

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Turkey which are under pressure of urbanization and internal migration from rural areas to city centers or suburbs.

Meanwhile, due to its unique geographic location there are stunning potential of agricultural landscape potential in Turkey as it is surrounded by different climate characters that enables thriving of different crop types. Despite the fact of its agricultural landscape potential, there is no apparent effort to use these lands as landscape focal points to attract tourists or generate income to the local inhabitants. However, usage of these fields for agricultural tourism is one of the best ways to stop landscape fragmentation as well as slowing down the migration problem.

Agricultural tourism can be defined an activity of visiting agricultural land for family training, resting or leisure by participating to the daily routines of the landowner or local inhabitants (Ainley & Smale, 2010). Agricultural tourism has also evolved by the time and became an activity of escaping from the crowd and complexity of the city centers by short term leasings of the rural cottages or permanently buying a small land to visit at weekends for hobbies or organic food production (Butler et al., 1998).

Agricultural tourism is generally evaluated as an activity for people that suffering from low income in rural regions as an alternative source of making money (Oppermann, 1998). The visitors or tourists are not only benefited from what offered in ranches, farms or villages but also share the cultural commons with local inhabitants by being a part of the daily activities, eating habits and some other routines (Contini et al., 2009). But agricultural tourism can not be limited to participating daily routine of the farmers, testing different foods and beverages. There are also some complementary activities such as visiting local natural reserves or parks, trekking, jogging, horse riding and eco-tourism.

In world wide scale, there are some leading countries that put special efforts in agricultural tourism such as Canada, Australia, United States and New Zealand. In these countries, the agricultural tourism is accepted one of the most strategic tool for new incomes generations. For example, in Alberta-Canada farm life, flower fields and sheepherding are advertised for tourist on different media to create an attraction points by triggering the potential users' appeal. Similarly, Ontario, Quebec, Manitoba, Saskatchevan, New Brunswick and Nova Scotia are also important areas that benefited from agricultural tourism revenues. In United States, for promoting rural life and farms the farmers are allowed for marketing their products to enhance the rural-urban interactions among peoples and cultures as well as informing the all stakeholders on the need of rural life by organizing conferences and small workshops. In United Kingdom, all activities for enhancing agricultural or rural tourism are managed by Farm Holiday Bureau (FHB). Other countries that have agricultural tourism potential can be summarized as Galapagos Islands, Belize, Peru, Fiji and Nepal (Irshad, 2010).

In Turkey, agriculture and agricultural activities has inherent strategic connections with national history as well as shaping the sociological structure of the community. The way of living is shaped in accordance with agriculture practices in Turkish culture. Despite the fact that agriculture and agricultural activities have gradually lost its significance in Turkish economy due to internal migration from rural to urban, there is still very high contribution of agricultural economy to national GDP. Extend of agricultural areas in Turkey has important effects on ecological and economical structure of the country. Geographic location of Turkey is on transition climatic zones which enable various micro climatological conditions that are suitable to carry out diverse agricultural practices and growing up various crops and fruits. Thus, different landscapes are formed representing the cultural and climatological character of each unique geographic location. For example; Tea is for Eastern Black Sea region, Grape and olives are for Aegean, Sunflower is for Marmara and Cotton is for Mediterranean side. These large fields and associated practises have also teleconnections with sociological and cultural formation of the regions as agricultural landscapes (Dirik, 2005).

Ministry of Culture and Tourism announced national tourism strategy in frame of 2023 vision by taking geography, climate and cultural properties as reference for developing original policies (TTSEP, 2007). The action plan was prepared by considering how to develop eco-tourism at national domain. The plan is based on using local workshops to raise public awareness, advertising cultural and traditional handcraft arts, determining important geographic touristic hot spots, determining trekking routes and planning eco-tourism draft plans to promote eco-toursim. Eventhough, the report is deeply handle and focused on promoting nature and culture tourism, there is no stress on how to develop agricultural tourism in Turkey except the proposed “olive corridor” route from Kapıdağ Peninsula, Avşa Island to Marmara Island. From this perspective, agricultural tourism history goes back nearly 100 years in Europe and United States whereas recently comes in to agenda in Turkey with public and private initiatives. For example, holiday farms in Turkey have started with the help and efforts of “buğday ecological life support organization”. The project entitled as “TaTuTa” was specially designed to start ecological farms in different cities such as Erzurum, Erzincan, Artvin, Rize, Gümüşhane, Tokat, Samsun, Amasya, Sinop, Düzce, Sakarya, Muğla and Antalya from all geographic regions of Turkey (Yılmaz, 2008). On the course of the same project, ecological farming was encouraged to attract potential users by participating to farming activity and production of the crops that needed for daily feeding. The achievements of the project is considered very important in term of the agricultural tourism (Ayan & Kurt, 2011).

As inferred from the available literature, there is almost no effort except some local NGO initiatives for promoting different agricultural practices that represent culture and society like olive trees, sunflower fields, cotton fields and tea gardens. However, the above mentioned agricultural products are main determiners of the economy, sociology and culture of the harvested regions or cities and they should be integrated to national tourism policy by following promoting and protecting strategy.

The aim of the current study is to project the potential of agricultural tourism in course of cultural landscape concept in Turkey. The landscape value of the commercially important agricultural crops and their geographic location were assessed by prioritization of protection and usage policy. Potential benefits of agricultural landscapes to the local inhabitants and economy of the region were discussed. Finally, future usage scenarios of agricultural landscapes were suggested to make necessary implications for “good” and “bad” projections of agricultural landscapes.

Geographical and Climatological Setting

Turkey is located in a strategic corridor between Asia and Europe and surrounded by 36° - 42° N latitudes and 26° - 45° longitudes with approximately 814.578 km² surface area. The Turkish peninsula is bounded by the Black Sea on northern side, by Mediterranean on southern and Aegean on western side. Neighboring countries are

Greece and Bulgaria on northwestern, Georgia, Armenia, Iran, Iraq and Syria on eastern sides (Figure 1).

Figure 1. Study area (Turkey) and global geographic position

Geomorphological character of the country differs for regions and 75% of the total surface area is covered by mountains or hills. Mountains higher than 1000m are 56% of total surface. There are also many pastures, meadows and plains spread out on lowlands of the country. Regarding geomorphological properties and climatological character Turkey has dived in to 7 geographic regions. There are different climate types associated to specific geographic location such as continental climates in Mid-Anatolian region, Aegean climate in Aegean region and Black Sea climate in Black Sea region. Due to heterogenic climate character, more than 12000 taxa are registered in Turkey. Almost 3000 of them are endemic species. The general plant biodiversity is almost equal to total species number encountered in all European regions (Avcı, 2005; Demir, 2013). The vegetative structure of the country was also enhanced by very rich soil character and many water resources such as lakes, rivers and aquifers.

Analyzing of Agricultural Landscapes of Turkey

Some major agricultural products that contribute to annual GDP of the country have considered to be included in analysis. In the study the general setting of the related agricultural fields are first evaluated in terms of landscape formation and character then potential agricultural tourism possibilities are assessed from the protection and usage perspective. Finally, "good" and "bad" scenarios are suggested for the related landscapes.

Important Agricultural Landscapes of Turkey

The geolocation and heterogeneity of vegetative structure of the country enable many agriculture types in different eco-geographic regions in Turkey. Therefore, the available potential can be used to create new revenues by put in to practice agricultural tourism activities. The potential agricultural tourism zones were identified and evaluated from different geographic regions of Turkey. The potential areas are given in Figure 2.

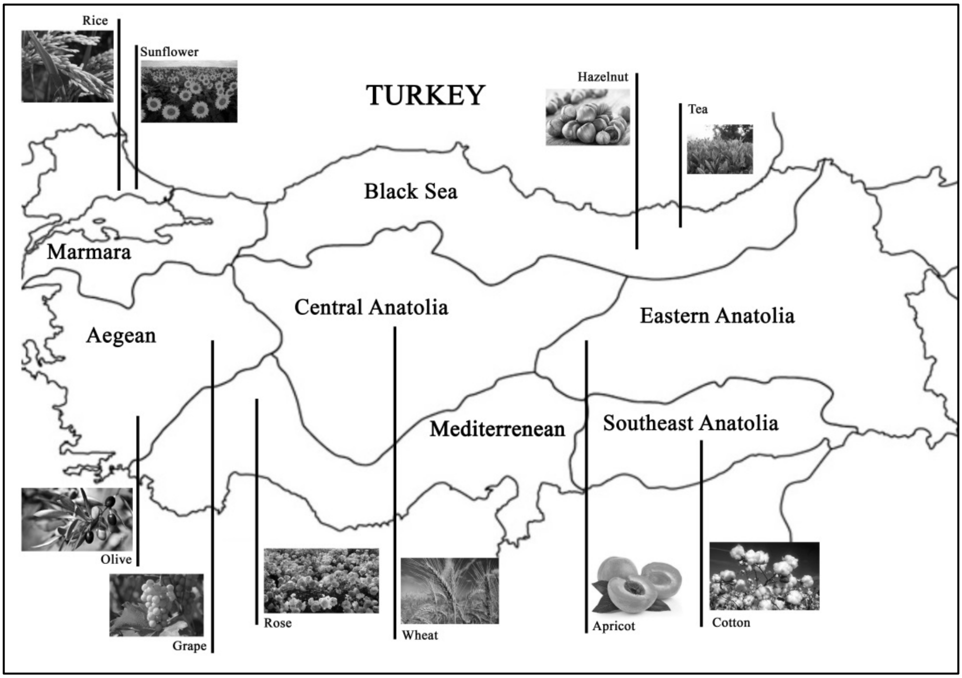

Figure 2. Potential agricultural landscapes of Turkey

Northern Anatolia (Black Sea) Region

The region is located on northern part of Turkey and bordered by approximately 1000km of the Black Sea littoral zone. The region has a humid and moderate climatic conditions with the highest precipitation rates of the entire country. The total annual precipitation rate may reach to 2200 mm in some parts of the region. The major agricultural products that can be potentially used for agricultural tourism are tea, hazelnut and corn.

Tea: Turkey is ranked as 7 among tea producing countries in the world wide scale. Tea planting can be seen from Georgia border to Ordu province staring from sea level and may reach up to 1000 m in altitude. The most of the tea production is from Rize and Trabzon cities. The other major cities that contributing to total tea production are Giresun, Artvin and Ordu. Tea plant grows up in areas receiving annual mean precipitation greater than 1200mm, with 70% humidity and 14 ^{0}C mean temperature (Usta, 2005; Abanuz, 2007; Özyazıcı et al., 2010). The 100% of the total tea demand is met from the Black Sea region (Figure 3).

Hazelnut: Turkey is the world major hazelnut producer that meets 75% of total demand of the world. Hazelnut cultivations is intensively carried out in Trabzon, Giresun and Ordu provinces but there are also some production in other cities situated along the southern Black Sea coastal zone. There are also small fields that allocated for hazelnut production in Marmara region. The plant needs cool and moderate weather with precipitation figures reach up to 1000-1500mm annually. It can be grown up to 750-1500 m altitude and 30 km to inner region zone. The 75% of 0total domestic hazelnut demand is met from the Black Sea region (Figure 4).

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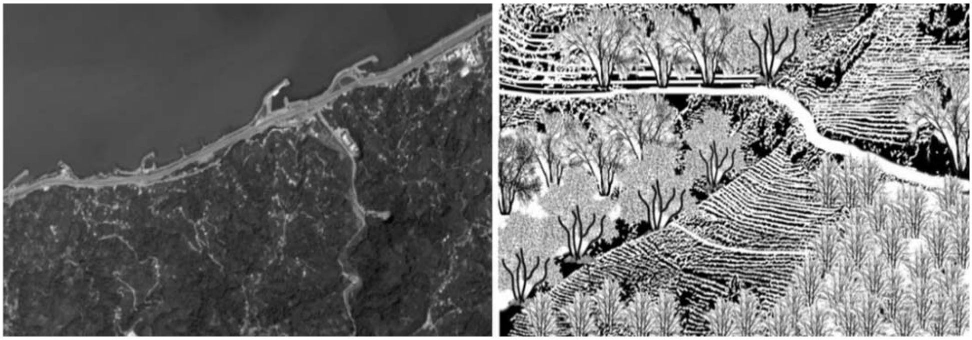
<tr><td colspan="2"></td></tr>
<tr><td>Agricultural Tourism Facilities
- Learning history of the tea in the region
- Learning the story of the tea processing
- Participating to tea harvesting activity
- Creating small tarditional shops
- Trekking inside the tea gardens
- Taking photography
- Tasting and recognizing of different tea types
- Dressing in traditional clothes
- Tasting local foods
- Participating to tea festival</td><td>Other Tourism Activities
- Trekking
- Camping
- Bird watching
- Botanic scout
- Rafting
- Fishing
- Highland tourism
- Culture and health tourism</td></tr>
<tr><td colspan="2">Protection/Usage Suggestions
- Rising the tourism awareness among local inhabitants by public education
- Creating alternative focal points
- Ensuring ecological sustainability
- Encouraging organic tea production
- Stopping agricultural land fragmentation
- Renewing tea cultivated fields at some periods
- Avoid using steep areas for cultivation
- Avoiding erosion by terracing
- Protection of original identity and way of life
- Protection of agricultural lands
- Legislation for spesific tourism activities
- Encouraging traditional construction and architecture
- Determining carrying capacity
- Preparing land use plans and projections for the future
- Carrying out cost/benefit analysis</td></tr>
<tr><td colspan="2">Activity Season: May-October</td></tr>
</table>

Figure 3. Agricultural landscapes of tea gardens

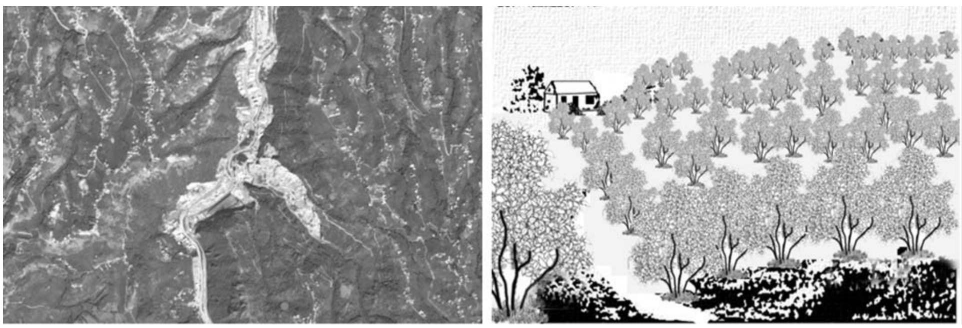
<table>
<tr><td colspan="2"></td></tr>
<tr><td>Agricultural Tourism Facilities
- Learning history of hazelnut in the region
-Participation to hazelnut harvesting activity
-Trekking inside hazelnut gardens
-Taking photographs of the gardens
-Creating small traditional shops
-Testing the products made of hazelnut
-Dressing in traditional clothes
-Tasting local foods
-Participating to the festivals</td><td>Other Tourism Activities
-Trekking
-Camping
-Bird watching
-Botanic scout
-Paragliding
-Belief tourism
-Highland tourism
-Culture and health tourism</td></tr>
<tr><td colspan="2">Protection/Usage Suggestions
-Rising the tourism awareness among local inhabitants by public education
-Creating alternative focal points
-Ensuring ecological sustainability
-Protecting tourism assets
-Enhancing soil quality and tillage depth
-Analysing best site for hazelnut cultivation
-Educating the farmers
-Protection of the agricultural lands
-Legislation for spesific tourism activities
-Encouraging traditional construction and architecture
-Protection of original identity and way of life
-Determining carrying capacity
-Preparing land use plans and projections for the future
-Carrying out cost/benefit analysis</td></tr>
<tr><td colspan="2">Activity Season: July-September</td></tr>
</table>

Figure 4. Agricultural landscapes of hazelnut gardens

Marmara Region

The region is located on northwestern part of the country. It connects Asia to Europe. The climate has a transition character from moderate maritime to continental type. Annual mean precipitation rate is around 600-700 mm and mean temperature is 15-16 ^{0}C. The major agricultural products that produced in the region are sunflower and rice.

Sunflower: The 75% of the total sunflower production of the world is harvested from Ukraine, Russia and Argentina. Turkey is ranked as 7 in global scale of sunflower producers (AR, 2014). The sunflower is grown up for its seeds oil that used in food industry. 73% of the total national production is produced in Marmara region (Figure 5). Sunflower needs rainy and moderate climate at first period of the cultivation and dry (sunny) weather during the blooming season (Süzer, 2008).

Agricultural Tourism Facilities	Other Tourism Activities
-Participation to sunflower harvesting -Trekking inside the gardens -Photographing the gardens -Dressing in traditional clothes -Tasting local foods -Staying and living inside the farms -Introducing sunflower processing steps -Creating small shops for the tourists -Designing festivals for sunflower	-Trekking -Horse riding -Bird watching -Botanic scout -Culture tourism -Beach tourism
Protection/Usage Suggestions -Rising the tourism awareness among local inhabitants -Creating alternative focal points -Protection of ecological sustainability -Protection of touristic assets -Protection of agricultural lands -Legislation for local tourism initiatives -Protection of traditional life -Determining of carrying capacity -Cost/Benefit analysis -Preparing landuse plans and projections for the future	
Activity Season: July-September	

Figure 5. Agricultural landscapes of sunflower gardens

Rice: Rice is very important agricultural product to overcome feeding problem of countries with very big populations. The world's leading producers are China, India and Indonesia. Eventhough its production has no important volume when compared to global rice producers, its special cultivation technique and visual effects of the paddy fields make it important to be used for agricultural tourism. In Turkey, it is produced in Marmara, Black Sea and Central Anatolian regions. The province of Edirne produces 40% of total national production of rice (Figure 6). The plant needs extreme water and warm weather conditions with high soil quality (ÇR, 2011; TT, 2012; Yazıcı, 2015).

Agricultural Tourism Facilities	Other Tourism Activities
-Participation to rice harvesting -Trekking around the rice fields -Photographing the rice fields -Introducing different rice types -Creating small shops for selling and tasting the rice -Dressing in traditional clothes -Tasting local foods - Designing festivals for rice	-Trekking -Horse riding -Bird watching -Botanic scout -Culture tourism -Beach tourism
Protection/Usage Suggestions -Rising the tourism awareness among local inhabitants -Creating alternative focal points -Protection of ecological sustainability -Avoiding wasting of too much water during the rice cultivation -Regulating the rice marketing policies -Protection of touristic assets -Protection of the agricultural lands -Introducing necessary legislation -Protection of traditional living style -Cost/Benefit analysis -Preparing landuse plans and projections for the future	
Activity Season: July-September	

Figure 6. Agricultural landscapes of rice fields

Aegean Region

The region situated along the coastline of the Aegean Sea between Turkey and Greece. The longest coastal strip of the country is dominated by Mediterranean climate type which is warm and arid in summers and moderate with intense rain in winters. The region is famous for its important agricultural products such as olives and grapes.

Olives: The major olive producer of the world is Spain with 70% of the total production. Turkey is ranked as 4 after some important European producers. The olive cultivation has important cultural inheritance with Mediterranean culture. The olive cultivation is carried out in Aegean, Marmara and Mediterranean regions (Figure 7). The olives are grown up for its oil that is widely used in food and cosmetic industries. This fruit is generally harvested from October to December and it is also an important component of Mediterranean type diet. It is widely consumed at breakfast and different types of Mediterranean type salads and sandwiches. This plant is naturally grown up in

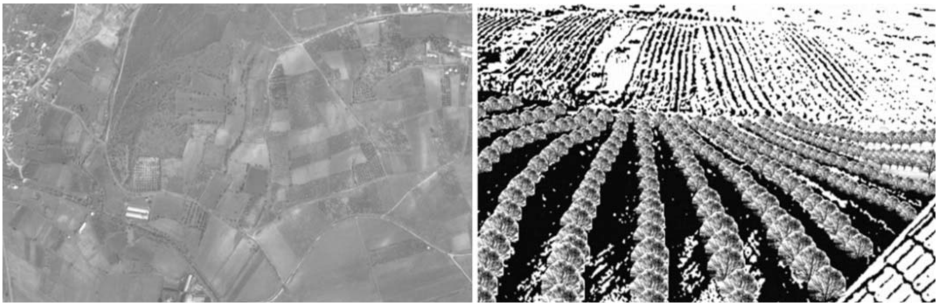
Mediterranean type climates (Kumrul & Kovancı, 2004; Efe et al., 2009; ZZR, 2016).

Agricultural Tourism Facilities	Other Tourism Activities
-Introducing the history of the olive in the region -Participation to harvesting activity -Trekking inside olive gardens -Photographing the olives -Tasting the olives and olive oils -Creating small traditional shops for olive products -Dressing in traditional clothes -Tasting local foods -Participation to olive festivals	-Trekking -Camping -Water sports -Sea and Sun tourism -Culture tourism -Health tourism -Belief tourism

Protection/Usage Suggestions
-Rising the tourism awareness among local inhabitants -Creating alternative focal points -Protection of ecological sustainability -Stopping land fragmentation -Working on different types of olive generations -Protecting of touristic assets -Preparing necessary legislation -Protecting agricultural lands -Protecting traditional architecture and life -Determining carrying capacity -Cost/benefit analysis -Preparing landuse plans and projections for the future
Activity Season: September-November

Figure 7. Agricultural landscapes of olive gardens

Grape: Turkey is ranked as 6 in global scale in terms of grape production (URL-1). Cultivation of the grape is implemented as vineyards and harvested from june to october in Turkey. Growing conditions of the fruit are suitable with Mediterranean and continental type climatological conditions. It can be naturally found in Aegean, Marmara, Mediterranean and Southeastern regions of Anatolia. Places with 500-600 yearly mean precipitation and located on southern aspects with high sun exposition are suitable for the fruit (Alsancak Sırlı et al., 2015). This fruit is also has cultural connections coming from historical background and related to daily life of the inhabitants (Fig. 8).



Agricultural Tourism Facilities	Other Tourism Activities
-Introducing the history of the grape in the region -Participation to harvesting activity -Trekking inside the gardens -Photographing the gardens -Introducing grape types -Creating small shops for grape and grape products -Tasting local foods and beverages -Participation to grape festivals	-Trekking -Camping -Water sports -Sea and Sun tourism -Culture tourism -Health tourism -Belief tourism

Protection/Usage Suggestions
-Rising the tourism awareness among local inhabitants through education -Creating alternative focal points -Protection of ecological sustainability -Stopping land fragmentation -Working on different cultivation techniques to reach high quality -Protection of touristic assets -Preparing necessary legislation -Protecting agricultural lands -Protecting traditional architecture and life -Determining carrying capacity -Cost/benefit analysis -Preparing landuse plans and projections for the future
Activity Season: June-October

Figure 8. Agricultural landscapes of vineyards

Mediterranean Region

The region is located on Mediterranean sea coastal zone with Mediterranean type climatic conditions the major agricultural product having agricultural tourism potential is rose. This important plant is grown up in rose gardens.

Rose: Turkey is ranked as first in world wide scale of rose producing countries. 80% of the total national production is carried out in Isparta province (Figure 9). Some other rose producing cities are Afyon, Denizli and Burdur (GR, 2015). Rose has high tolerance of environmental conditions. The ideal vegetative temperature is around 16-19^{0}C (MEGEP, 2007).

<table>
<tr><td>Agricultural Tourism Facilities
-Introducing the history of rose in the region
-Participation to rose harvesting
-Trekking inside rose gardens
-Photographing of the roses
-Introducing rose types
-Creating small shops for selling rose products
-Tasting local foods
-Participation to rose festival</td><td>Other Tourism Activities
-Trekking
-Camping
-Water sports
-Culture tourism
-Health tourism
-Belief tourism
-Highland tourism</td></tr>
<tr><td colspan="2">Protection/Usage Suggestions
-Rising the tourism awareness among local inhabitants
-Creating alternative focal points
-Protection of ecological sustainability
-Stopping land fragmentation
-Working on different types of rose generations
-Protecting of touristic assets
-Preparing necessary legislation
-Protecting agricultural lands
-Protecting traditional architecture and life
-Determining carrying capacity
-Cost/benefit analysis
-Preparing landuse plans and projections for the future</td></tr>
<tr><td colspan="2">Activity Season: May-July</td></tr>
</table>

Figure 9. Agricultural landscapes of rose gardens

Centre Anatolian Region

The region is located on mid-section of the Anatolia. The region has the lowest precipitation rate with very cold winters and dry summers. Agricultural activities are rely on cereals such as wheat, barley and pea. The highest production comes from wheat croplands which makes it potential agricultural activity with agri-tourism potential.

Wheat: the leading wheat producers of the world are China, European countries and India. Turkey is ranked as 7 in world's total wheat production (Kızılaslan, 2004). In Turkey, the leading region for wheat cultivation is Centre Anatolia and followed by Marmara and Mediterranean regions (Fig.10). The city of Konya has the highest production rate and largest cultivation areas (BR, 2005). Vegetative temperature for wheat is around 5-10^{0}C and requires cool weather with special soil conditions (Alpaslan et al., 1998).

Agricultural Tourism Facilities	Other Tourism Activities
-Introducing wheat processing units	-Trekking
-Visiting the wheat harvesting areas	-Camping
-Trekking inside the fields	-Culture tourism
-Photographing the fields	-Health tourism
-Introducing different wheat types	-Horse riding
-Tasting local foods and wheat products	
-Creating small shops for wheat products	

Protection/Usage Suggestions
-Rising the tourism awareness among local inhabitants
-Creating alternative focal points
-Protection of ecological sustainability
-Stopping land fragmentation
-Working on different types of wheat generations
-Protecting of touristic assets
-Preparing necessary legislation
-Protecting agricultural lands
-Protecting traditional architecture and life
-Determining carrying capacity
-Cost/benefit analysis
-Preparing landuse plans and projections for the future

Activity Season: May-August

Figure 10. Agricultural landscapes of wheat fields

Southeastern Anatolian Region

The Southern Anatolia is the smallest geographical region in Turkey with large plains spreaded out towards Arabian Peninsula. It has dry climatic conditions with the highest evaporation rates recorded in Turkey. The region is famous for cotton production which is around 300.000 tones annual production.

Cotton: The world's leading cotton producers are China and India. Turkey is ranked as 7 in terms of total world production of cotton (PR, 2016). The production of cotton is mainly from Southeastern, Mediterranean and Aegean regions of Turkey (PR, 2012). After the GAP project carried out in the region the large plains of Şanlıurfa province met with required water and became the largest cotton producer of the country. The optimum vegetative conditions should be 19-20 ^{0}C temperature and annual precipitation rate not less than 500mm. It can be grown up from sea level up to 1000-

1200 m altitude. It is considered suitable for agricultural tourism activities especially during the blooming season (Fig. 11).

Agricultural Tourism Facilities	**Other Tourism Activities**
-Introducing the history of cotton in the region -Participation to cotton harvesting -Trekking around the cotton fields -Photographing the fields -Introducing cotton made products -Dressing in traditional clothes -Tasting local foods -Participation to cotton festival	-Trekking -Culture tourism -Health tourism -Belief tourism -Highland tourism

Protection/Usage Suggestions
-Rising the tourism awareness among local inhabitants
-Creating alternative focal points
-Protection of ecological sustainability
-Stopping land fragmentation
-Working on different types of cotton generations
-Protecting of touristic assets
-Preparing necessary legislation
-Protecting agricultural lands
-Protecting traditional architecture and life
-Determining carrying capacity
-Cost/benefit analysis
-Preparing landuse plans and projections for the future

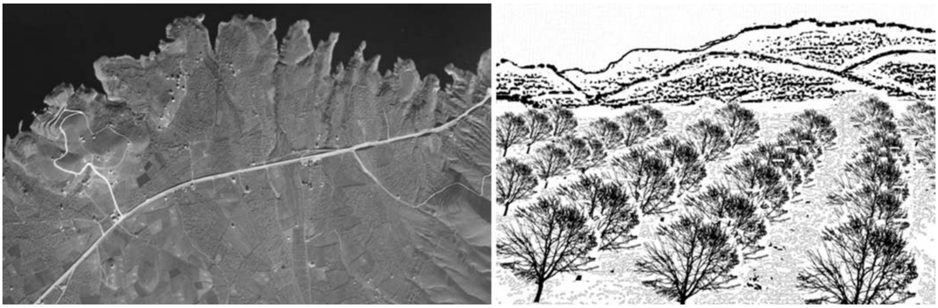
Activity Season: September-November

Figure 11. Agricultural landscapes of cotton fields

Eastern Anatolian Region

The region is mainly covered with high plateaus and mountains eventhough it is the largest region in terms of total surface area only 10% of the total area is used for agricultural practices. The region is dominated by continental climate type characterized by very cold winters and dry summers.

Apricot: Apricot is very important fruit for healthy nutrition side products of the food industry. Turkey is leading country with 20% of total world production of apricot. The apricot production mainly carried out in Eastern Anatolian region and the city of Malatya is famous for its apricot gardens. (Arslan, 2015; Topçu, et al., 2010; Acarsoy & Mısırlı, 2015). The fruit needs dry and relatively warm weather conditions and suited to the land parcels facing to southern aspect. Due to its special flowering, color and odor, the apricot gardens are considered suitable for agricultural tourism projects (Figure 12).



Agricultural Tourism Facilities	**Other Tourism Activities**
-Introducing the history of apricot in the region	-Culture tourism
-Participation to apricot harvesting	-Nature tourism
-Trekking inside the gardens	-Horse riding
-Photographing the gardens	
-Creating small shops for apricot products	
-Tasting local foods	
-Participation to the apricot festival	

Protection/Usage Suggestions
-Rising the tourism awareness among local inhabitants
-Creating alternative focal points
-Protection of ecological sustainability
-Stopping land fragmentation
-Working on different types of apricot generations
-Protecting of touristic assets
-Preparing necessary legislation
-Protecting agricultural lands
-Protecting traditional architecture and life
-Determining carrying capacity
-Cost/benefit analysis
-Preparing landuse plans and projections for the future
Activity Season: May-July

Figure 12. Agricultural landscapes of apricot gardens

RESULTS AND RECOMMENDATIONS

Agricultural lands are very important landscapes that they connect rural to urban ecosystems and enable ecological continuity of the eco-geography. These areas also serve to the world population as inevitable food generating natural processing units. However, recent advancements in the field of bio-technology boosted intensive cultivation practices. The aim is to maximize yield volume by per unit area. Despite the increase in total agricultural product volume, these technological efforts created unappreciated and ugly agricultural zones that do not suit to ecological harmony of the natural environments. These adverse effects can be seen as huge amounts of artificial fertilizers that are not flourishing the agriculture soils but making them chemical absorbing media and human made ugly greenhouses diminishing visual landscape quality of the environment.

It should also be noticed that rising public awareness and NGO educational efforts created a tendency towards environment friendly organic agriculture.

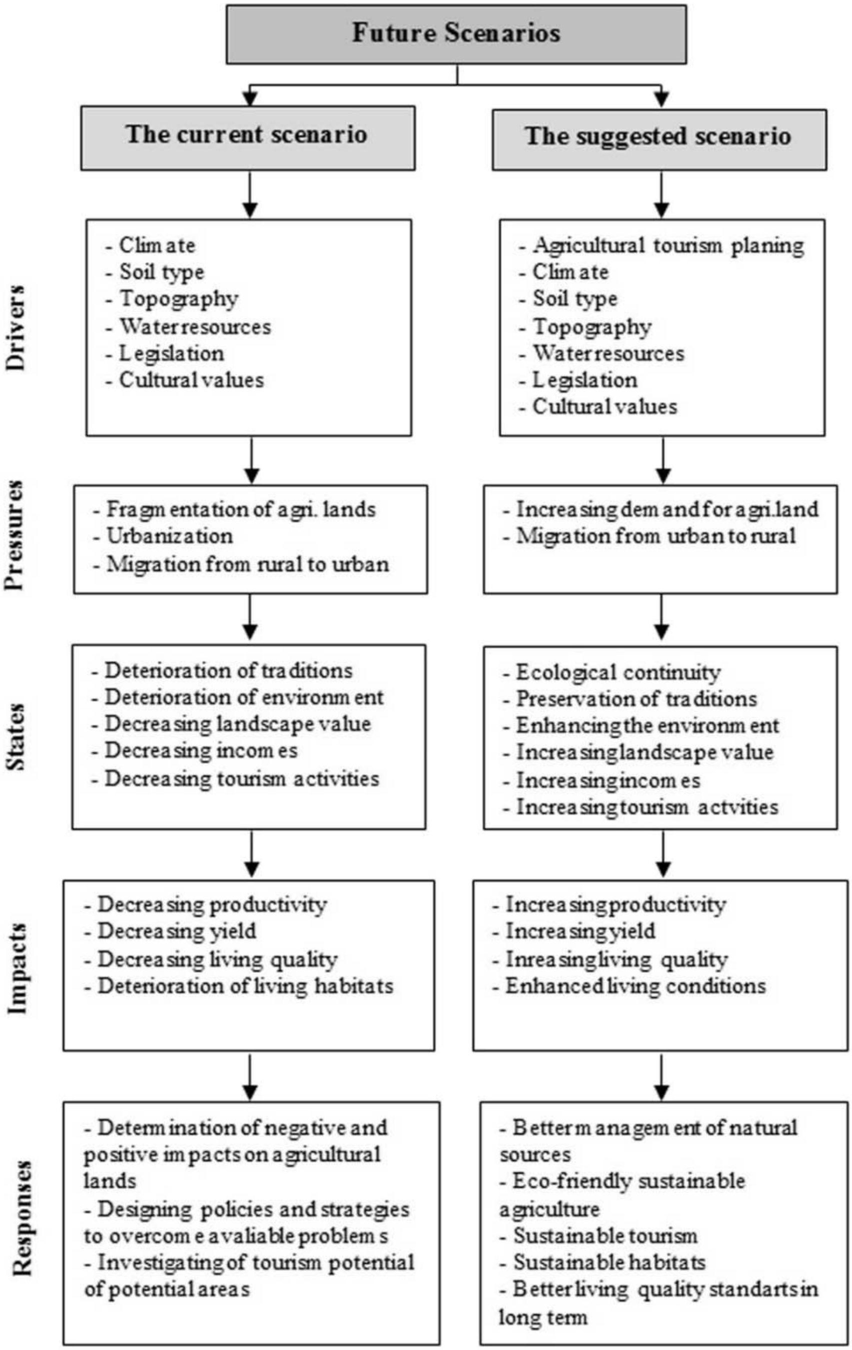


Figure 13. Future scenarios for agricultural tourism strategy

Therefore, there are important efforts among farmers for setting off new organic agricultural fields. As a supporting factor, agricultural tourism can be considered another alternative income source for the local inhabitants and farmers during the transition period from intensive to organic cultivation system. There are many successful applications of agricultural tourism from different geographic regions in the world (Yamaner, 2008), such as vineyards in Portugal and apple gardens in Connecticut-USA.

It is an isuue of high priority to define potential agriculture zones and crop types that can be used for tourism activities in Turkey. Such efforts can guide to future studies on designing and implementing of national agricultural tourism projects. Turkey has a unique geographic location and various climate types that are suitable for agricultural tourism. Agricultural products that are accepted as important in terms of total world production such as tea, hazelnut, rose and apricot should be evaluated for agricultural tourism potential by taking in to account landscape planning, recreation and protection/usage principals.

Geographic position and national history of Turkey oblige the country to be self-sufficient in many aspects. Eventhough, the 21.century is accepted as information era meshed with electronic networks, in case of any potential no country should leave off being agricultural self-sustainable. Instead, the technological information can be used to create environmentally friendly and pleasant landscapes for the people. Turkey, with no exception, should also follow a sustainable agricultural policy as a strategic approach to meet unexpected future risks. Within frame of this approach, agricultural tourism should be considered as an important part of the national agricultural policy as an attractive supporting activity of farmers and local inhabitants. The current study can be accepted as basis for future planning of the agricultural tourism activities in Turkey.

Finally, "good and "bad" scenarios were suggested for better practical analysing of the necessity for agricultural tourism (Fig.13). In this context, the current situation is accepted as "bad" scenario and application of agricultural tourism is "good" scenario. Considering the two scenarios, a national policy for agricultural tourism based on protection/usage strategy is evaluated as an issue of high priority.

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Chapter 8

The Effect of Plants on Indoor Air Quality

Hakan SEVIK*, Mehmet CETIN*, Nur BELKAYALI*, Kerim GUNEY*

INTRODUCTION

47% (2.9 billion) of the world population were living in urban areas in 2000 whereas it is expected that 60% of the world population will be living in urban areas in 2030. In European countries, more than two thirds of the total population live in urban areas (Konijnendijk, 2003). According to the Address-Based Population Registration System of the Turkish Statistical Institute for the year 2015, total population of Turkey is 78,741,053. Of this population, 72,523,134 live in city centers whereas 6,217,919 live in towns and villages. These numbers indicate that 92.1% of Turkish population live in city centers (URL1).

Rising population lead to an increase in urbanization. The number of people living in unit area is gradually increasing. Nowadays, people living in the cities spend at least 80% of their lives in closed areas (Güllü & Menteşe, 2007; Cetin, 2016). Indoor air quality is important for people who spend majority of their lives indoors. The decrease in indoor air quality directly influences people's health and performance (Konijnendijk, 2003; Cetin, 2016). The studies of the US Environmental Protection Agency (EPA) showed that the level of indoor pollutants can be 5 to 100 times higher than that of the outdoor pollutants. The influence of outdoor pollution has been known since the early 20th century. However, research dwelling on indoor air quality or the issue of indoor air quality came to the fore 30 years ago (Bulgurcu, 2005).

Indoor environment refers to all the buildings that are constructed by people to separate them from outdoors with the intention of creating a more appropriate indoor environment compared to outdoors. Indoor air refers to the air in houses, public buildings, schools, hotels, theatres, cinemas, libraries, hospitals, shopping malls, vehicles, waiting rooms, and so on. The presence of biological, physical, and chemical elements such as carbon monoxide (CO), carbon dioxide (CO_2), sulphur dioxide (SO_2), nitrogen oxides (NO_x), various microorganisms, and allergens that are harmful with a negative influence on human beings in houses and other non-industrial buildings is known as "indoor air pollution" (Öztürk and Düzovalı, 2011; Cetin, 2016).

Indoor air quality has drawn the attention of many researchers from various disciplines, and hundreds of studies have been conducted in this field. In addition to city centers (Son, Breyse & Yang 2003), the vehicles that are used for public transportation (Kapkın & Uzal, 2007), museums and historical places (Karaca, Alagha & Gören, 2009), car parks (Atımtay, Gerçek, Güngör, Görmez, Ergun & Doğan, 2000), hospitals (Wang, Bi, Sheng, Fu, 2006), and even planes (Karakoç, Işıklı, Atmaca, Toka & Kaba, 2007) have been the subject of studies in terms of the change and amount of indoor air quality. Similar studies were conducted by Lee & Chang (2000) in Hong Kong,

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Ahman, Lundin, Musabasic & Soderman, (2000) in Stockholm, Fuji, Shima, Ando, Adachi & Tsunetoshi, (2002) in Japan, Godwin & Batterman (2007) in the United States, Wargocki, Wyon & Sundell, (2000) in offices in Switzerland and Denmark, Guo, Lee & Chan, (2004) in ice rinks in Hong Kong, La Gennusa, Rizzo, Scaccianoce & Nicoletti (2005) in Italy, Schieweck, Lohrengel, Siwinski & Genning, (2005) in Germany, Worobiec et al., (2008) in Poland, De Santis, Di Palo & Allegrini (1992) in Italy, Reddy, Suneela, Sumatı & Reddy, (2005) in museums in India, Lee, Li & Ao, (2002) in Hong Kong, Berube et al., (2004) in Britain, Lee & Jo (2006) in Korea, Breysse et al., (2005) in Baltimore, and Gilbert et al. (2006) in houses in Canada.

Another area of study on which previous studies focused is the influence of indoor air pollution on human health. Many studies were conducted on the subject. The study by Pekey et al. (2007) entitled “Determining the indoor, outdoor, and personal exposure levels of volatile organic compounds, heavy metals, and inorganic gas phase pollutants in micro-environments in Kocaeli province”, Özyaral and Keskin’s (2005) study entitled “Effects of Indoor Atmosphere on Health: Cacosmia Syndrome”, and Alyüz & Veli’s (2006) study entitled “Volatile Organic Compounds in Indoor Air and Their Health Effects” can be examples of this kind.

Though indoor air quality is such an important subject that draws considerable attention, there is not enough research to produce a solution for this problem. The studies regarding this issue generally concentrate on air conditioners or ventilation systems (Köksal, 2001). However, these systems are very expensive. In addition, as mentioned above, they lead to loss of heat. Hence, they cannot be used at adequate levels particularly in winter months when heating cost is high. Among the factors changing indoor air quality, the activities of living beings in these environments come first. Due to living beings’ metabolic activities, indoor air quality generally changes for worse for human health.

Plants in indoor air quality are also living beings, and they have an influence on indoor air quality. In the place they grow, plants reduce air pollution (Tani & Hewitt, 2009; Cetin & Sevik 2016); reduce noise (Cetin, 2016); increase aesthetic value, have a positive psychological effect (Belkayalı, Güloğlu & Şevik, 2016); provide energy conservation (Cetin & Sevik 2016); prevent erosion (Turna & Güney 2009); reduce wind speed and hold the soil with their roots, thus preventing washing away of the soil with rainfalls and streams, and protect wildlife and hunting resources. Open-green areas with plantation are important activity areas for both adults and children (Mutlu & Tepe, 2014). Besides, indoor plants increase the productivity of people working in the environment they grow in (Cetin 2016) as well as relieving physiological stress and reducing negative emotions.

Such advancement of the ornamental plants market made the researchers to be interested in various issues such as protection of plants (Kravkaz & Vurdu, 2010); cultivation of plants (Kravkaz Kuscu, 2008); resistance of plants to stress factors (Yiğit, Sevik, Cetin & Kaya 2016); effects of water and water quality (Mutlu & Tepe, 2014); genetic variability of plants (Güney, Sevik, Cetin & Güney 2016), raising awareness about plants and legal dimension of the issue (Guloglu 2015), thus resulting in various studies on these issues. However, the plant has been made about the air quality impacts of the number of studies is quite low.

Plants need certain conditions to survive in their surrounding environments and change environmental conditions through their metabolic activities. Plants emit oxygen and absorb carbon dioxide when environmental conditions are suitable for their growth. When conditions change, the situation becomes reverse. This may result in negative influences on human health particularly in indoor environments that are limited.

It is possible to say that CO_2 is the pollutant whose amount in an environment changes in the fastest way due to living beings' metabolic activities. Thus, the change in the amount of CO_2 needs to be analyzed under a separate title.

THE CHANGE IN THE AMOUNT OF INDOOR CO_2

CO_2 is one of the gases whose indoor amount changes in the fastest way as a result of human metabolic activities. The composition of air whose 21% is O_2 and 0.033% is CO_2 when inhaled from normal atmosphere turns to have an O_2 level of 16-17% and a CO_2 level of 4% when exhaled from lungs. This change leads to a rapid increase in CO_2 amount particularly in environments such as schools, malls, and hospitals where people are collectively active (Bulgurcu, 2005). When the rate of carbon dioxide increases in an environment, it leads to fatigue, difficulty in perceiving, and sleepiness. CO_2 leads to performance loss and various complaints whose etiologies cannot be identified easily. When the amount of CO_2 exceeds 1000 ppm, one may experience headache, vertigo, fatigue, concentration disorders, and smell disorders. When it exceeds 1500 ppm, it results in irritation in throat and nose, nasal flow, cough, and eye drainage (Ercan, 2012). This is particularly evident in indoor environments where majority of daily life is spent. The reduction in indoor air quality influences people's performance and health. According to EPA, the maximum carbon dioxide rate for indoor environments is 800 ppm. It is expressed that this rate may rise up to 1000 ppm in schools and conference halls where there are many people (Sevik & Belkayalı, 2012). However, previous studies indicated that indoor CO_2 level is much higher than this number.

Indoor CO_2 is a pollutant that cannot be perceived by people easily. The reason is that CO_2 cannot be sensed by sense organs contrary to the factors disturbing people and determining the indoor comfort conditions. Factors such as malodor, high noise, disturbingly low or high heat, and over-illumination or low illumination are sensed by sense organs. However, CO_2 does not stimulate sense organs. Thus, its increase does not directly influence people in the environment. However, it leads to ailments such as headache, vertigo, and concentration disorders. This makes CO_2 more important than other pollutants.

There are many studies dwelling on CO_2 amount. Some of them are Bulgurcu's (2005) study entitled "Problems and Solutions for Indoor Air Quality in Schools", Baysan's (1999) study entitled "The Influence of Indoor Air Quality in Buildings on Human Health", Bulut's (2007) study entitled "The Analysis of Indoor Air Quality Measurements in Houses", Güllü & Menteşe's (2007) study entitled "Bioaerosol Levels in Indoor Air Quality", Vaizoğlu's (2007) study entitled "Formaldehyde Influence in Certain Indoor Environments", Çelebi's (2007) study entitled "Analyzing Radon Concentration Rates in Houses in Terms of Building Biology", the study of Sofuoğlu et al. (2007) entitled "A Quantitative Analysis of Volatile Matter Content in Particles Settling in Interior Surfaces of Buildings", Köksal's (2001) study entitled "Indoor Air Quality Betterment in Closed Areas", and Menteşe's (2008) study entitled "Detecting Indoor Pollutants Via Material Analysis and Room Experiments".

THE INFLUENCE OF PLANTS ON CO_2

There are not so many studies dwelling on the influence of plants on indoor CO_2 amount. In fact, it is known that plants photosynthesize and reduce the amount of CO_2 when they get adequate amount of light and heat (Efe, 2010; Kacar et., 2010; Cetin, 2016; Cetin & Sevik, 2016). However, there are only a limited number of studies indicating the extent of this influence.

Obviously, environmental conditions for each plant to survive changes. Even when the conditions are optimum, plants may have different photosynthesis rates and thus have varying degrees of influence on indoor CO_2 amount. Torpy, Irga & Burchett (2014) researched the potentials of *Aglaonema commutatum*, *Aspidistra elatior*, *Castanospermum australe*, *Chamaedorea elegans*, *Dracaena deremensis 'compacta'*, *Dypsis lutescens*, *Ficus benjamina*, and *Howea forsteriana* to reduce indoor CO_2 amount. In the end, he concluded that plants have a wide variation depending on the light conditions.

Tarran, Torpy & Burchett (2007) placed plants in environments with and without air conditioning systems and measured CO_2. In the end, it was seen that when there was no plant in environments with air conditioning systems, CO_2 amount corresponded to 409±6.2 ppm whereas this rate reduced to 366±7.3 ppm when there were 3 plants in the environment. In addition, when there was no air conditioning system in the environment, CO_2 amount corresponded to 386±17 ppm whereas this rate reduced to 290±15 ppm when there were 3 plants in the environment. Sevik et al., (2015) stated that the amount of CO_2 in woods during winter months corresponds to 391 ppm in daylight and 422 ppm at night on average. However, these rates are as follows for summer months: 148 ppm in daylight and 229 ppm at night. Tarran et al. (2007) stated that the presence of plants reduces the CO_2 amount in offices with air conditioners at a rate of 10% while this rate corresponds to 25% in naturally ventilated environments.

Lim, Kim, Yang, Kim, Lee & Shin, (2009) studied the influence of indoor plants on indoor air quality. They compared spaces with and without indoor plants. Initial CO amount was $1.06 \pm 0.45\ \mu g \cdot m^{-3}$ while this rate corresponded to $1.05 \pm 0.36\ \mu g \cdot m^{-3}$ in spaces without plants at the end of 90 days. The number was found to be 0.96 ± 0.38 in spaces with plants. Initial CO_2 amount was $376 \pm 87\ \mu g \cdot m^{-3}$ while it became $377 \pm 87\ \mu g \cdot m^{-3}$ in spaces without plants at the end of 90 days and reduced to $335 \pm 53\ \mu g \cdot m^{-3}$ in spaces with plants.

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Torpy et al. (2014) found out that *D. lutescens* with a leaf surface of 1 m^2 reduces the CO_2 amount by 657 ppm in 1 hour while *D. deremensis* reduces by 397 ppm. Cetin and Sevik (2016) conducted a study regarding the reduction in CO_2 amount on an area of 0.5 m^3. During the day, *Ficus elastica* reduced it by 2216 ppm, *Yucca massengena* by 2578 ppm, *Ocimum basilicum* by 401 ppm, *Sinningia speciosa* by 725 ppm, and *Codiaeum variegatum* by 790 ppm. Another study was conducted by Sevik, Cetin & Işınkaralar (2016) on an area of 0.5 m^3. During the day, CO_2 amount was reduced by Şeflera by 1252 ppm and by 252 ppm by fuchsia.

These studies give us an opinion about to what extent plants can be influential on reducing CO_2 amount. Previous studies proved that a beech tree is capable of meeting the oxygen need of 10 people (Sağlam & Özkan, 2011; Hamzaçebi, Aktürk & Çelik, 2012). Barış (1998) stated that a tree with a leaf surface of 1500 m^2 can meet the oxygen need of ten people, and there is a need for 5400 young plants with 0.5 m^3 petals to achieve the same influence of such a tree. Therefore, there is a need for 540 plants to meet the daily oxygen need of a human.

Similar results were obtained in some other studies as well. Torpy et al. (2014) compared 8 species. In the end, they revealed that if *D. lutescens*, which is the species having the highest reducing effect on CO_2, is used, 249 plants need to be placed in an environment to balance the CO_2 amount produced by a human being. Torpy et al. (2014) stated that if *H. forsteriana* is used for the same purpose, there will be need for 206 plants since *H. forsteriana* has wider leaf surface.

Pennisi & van Iersel (2012) studied the influence of *Spathiphyllum* 'Sweet Chico' *Aglaonema* spp., *Sanseveria trifasciata* 'Hahnii', *Chamaedorea elegans*, *Dracaena marginata*, *Dracaena godseffiana* 'Florida Beauty', *Dracaena deremensis* 'Lemon Lime', and *Dracaena deremensis* 'Janet Craig' on indoor air quality. In the end, it was found that there will be a need for 400 spathiphyllum planted in pots of 15 cm to clean the amount of CO_2 produced by a person.

However, it is known that certain plants might have more influence. As a matter of fact, Erengezgin (2008) reported that a leaf surface of 25 m^2 produces 27 gr oxygen corresponding to the amount consumed by a human being. He also stated that 1 m^2 of grass roof can meet the oxygen need of 4 people in summer months. These data are indicative of the fact that plants have a potential to reduce indoor CO_2 amount. Therefore, there is a need for more and a bigger variety of studies in this field.

THE INFLUENCE OF PLANTS ON OTHER POLLUTANTS

Many studies showed that indoor ornamental plants can be used to reduce various indoor pollutants (Torpy, Irga, Moldovan, Tarran & Burchett, 2013; Irga, Torpy & Burchett, 2013). It is known that plants that are grown indoors can be used to better indoor air quality. As a matter of fact, previous studies indicated that green plants photosynthesize under adequate light conditions, and as a result of photosynthesis, the amount of CO_2 in the environment reduces (Tarran et al., 2007), the rate of sulphur decreases (Atayeter, 2007), pollutants that are harmful for humans and other living beings (e.g. dust, ashes, pollens, smoke, particles) are filtrated, and air quality increases (Yılmaz, Bulut & Yeşil, 2006). Some studies were also conducted in relation to the influence of plants on these issues (Tarran et al., 2007).

Before anything else, plants reduce a lot of pollutants such as nitrogen and sulphur oxides, carbon monoxide (CO), volatile organic compounds (VOCs), particles, ozone, NO_2, formaldehydes, and heavy metals (Ceburnis & Steinnes, 2000; Aydogan & Montoya, 2011; Papinchak et al., 2009; Yang, Pennisi, Son & Kays, 2009). Lim et al., (2009) studied the influence of indoor plants on indoor air quality. They compared spaces with and without indoor plants. Initial CO_2 amount was $376 \pm 87\ \mu g \cdot m^{-3}$ while it became $377 \pm 87\ \mu g \cdot m^{-3}$ in spaces without plants at the end of 90 days and reduced to $335 \pm 53\ \mu g \cdot m^{-3}$ in spaces with plants.

Lim et al., (2009) studied the influence of indoor plants on indoor air quality. They compared spaces with and without indoor plants. Initial CO amount was found to be $1.06 \pm 0.45\ \mu g \cdot m^{-3}$ while at the end of 90 days, this rate reduced to $1.05 \pm 0.36\ \mu g \cdot m^{-3}$ in spaces without plants whereas this number corresponded to 0.96 ± 0.38 in spaces with plants. It was seen that CO_2 amount was initially 376 ± 87 $\mu g \cdot m^{-3}$ while at the end of 90 days, it was found to be 377 ± 87 $\mu g \cdot m^{-3}$ in spaces without plants whereas it was 335 ± 53 $\mu g \cdot m^{-3}$ in spaces with plants. Similarly, it was stated that indoor plants are also influential on formaldehyde, toluene, ethylbenzene, and xylene.

Many previous studies demonstrated the influence of plants on air quality in terms of many pollutants. The studies focusing on indoor air quality and its assessment generally involve parameters such as heat, relative humidity, air speed, carbon dioxide (CO_2), respirable suspended particulate matters (PM), volatile organic compounds (VOC), nitrogen oxides (NOx), carbon monoxides (CO), ozone (O_3), sulphur dioxide (SO_2), radon, formaldehydes (HCHO), and bacterial count (Bulut, 2007).

These parameters are the first parameters coming to mind in relation to increasing indoor air quality through plants, and there are many studies focusing on this issue.

Orwell, Wood, Burchett, Tarran & Torpy (2006) stated that indoor spathiphyllum and dracaena have important influence on volatile organic compounds, toluene, and xylene in the environment. Yang et al. (2009) studied the influence of indoor plants on indoor volatile organic pollutants. He used 28 species and revealed that the most influential plants are *Hemigraphis alternata*, *Hedera helix*, *Hoya carnosa*, and *Asparagus densiflorus*.

Wood et al. (2006) studied the influence of *Spathiphyllum*; Irga et al., (2013) studied the influence of *Syngonium podophyllum*; and Torpy et al. (2013) studied the influence of *Spathiphyllum wallisii* on volatile organic compounds (VOC). They suggested that plants can be used to increase indoor air quality.

Papinchak et al. (2009) stated that *Sansevieria trifasciata*, *Epipremnum aureum*, and *Chlorophytum comosum*, which are indoor plants, reduce the amount of ozone in the environment to a considerable extent. The control group of the study had 74.8 ppb of ozone while this number corresponded to 46.3 ppb in the spaces with plants. Wolverton, McDonald & Mesick (1985) denoted that CO and NO_2 pollutants can be reduced via *Chlorophytum elatum* and *Scindapus aureus*.

Aydogan & Montoya (2011) reported that *Hedera helix*, *Chrysanthemum morifolium*, *Dieffenbachia compacta*, and *Epipremnum aureum* can be used to reduce indoor formaldehydes. Tani & Hewitt (2009) stated that indoor *Spathiphyllum clevelandii* and *Epipremnum aureum* can be used to reduce aldehydes and ketones.

One of the prominent subjects regarding pollution is heavy metals. Particularly Ba, Cd, Cr, Cu, Fe, Ni, Pb, and Zn are remarkable heavy metals (Ugolini, Tognetti, Raschi & Bacci, 2013). Recently, various plants have frequently been used to monitor heavy metal pollution. In this regard, lichens (Conti & Cecchetti, 2001), algae (Ceburnis & Steinnes, 2000), leaves of tall plants (Gratani, Crescente & Varone, 2008), and trunk crusts (Fujiware, Gomez, Dawidowski, Perelman & Faggi, 2011) are used as bio-monitors (Ugolini et al., 2013).

Many studies were conducted to determine heavy metal concentration in plants and therefore their usability for increasing air quality (Islam, Rahman, Bahar & Habib, 2012). The studies revealed that plants are a good option to eliminate heavy metal pollution (Ceburnis & Steinnes, 2000).

However, this issue needs to be focused on for identifying which plant species are influential on which type of pollution. This has been one of the prominent issues recently. In relation to monitoring and eliminating heavy metals, studies were conducted in terms of *Aesculus hippocastanum* (Pb and Cu) (Tomasevic & Anicic, 2010), *Betula pendula* (Cd, Cr and Zn) (Petrova, Yurukova & Velcheva, 2014), *Elaeagnus angustifolia* (Pb, Cd and Zn) (Aksoy & Şahin, 1999), *Fraxinus excelsior* (Pb, Cu, Ni, Zn, Cr) (Aksoy & Demirezen, 2006), *Pinus pinea* (Cr, Cu and Pb) (Oliva & Mingorance, 2006), *Robinia pseudoacacia* (Celik, Kartal & Kaska, 2005), *Tilia* sp. (Pb and Cu) (Tomasevic & Anicic, 2010); (Cr, Ni and Pb) (Piczak, Lesniewicz & Zyrnicki, 2003), and *Quercus ilex* (Zn) (Gratani et al., 2008). New studies are added to these every passing day.

CONCLUSION and RECOMMENDATIONS

Due to the rapid development process in the world, the changes taking place in economic, social, cultural, and political areas accelerate the urbanization process, leading to the destruction of green areas. Rapid urbanization and industrialization put more distance between people and nature each day. This disrupts the harmony that is expected to exist between people and their environment. Human beings, as a part of the nature, have carried a part of nature to wherever they have lived. This has sometimes been in the form of a houseplant, a small garden, or sometimes a delicately organized park. In this sense, trees and brunches provide aesthetical and recreational benefits for parks, gardens, and landscape areas, besides their direct benefits. These are very important for human health (Yücel, Ocak, Özkan & Soydam, 2006).

Plants play important roles in aesthetic and functional terms in the design of landscape areas. This is because plant materials are vibrant, dynamic, malleable, decorative, aesthetical, economic, and functional, which makes them rich, diverse, and living ornamental materials for creating buildings and spaces (Gül, Ayter & Fakir, 2006). There are many characteristics of plant materials that make them different from other design elements. Perhaps their most important characteristic is that they are living, developing, and vivacious elements.

Plants are living beings. They either photosynthesize or respire depending on the conditions in the environment. When they photosynthesize, they produce oxygen using the carbon dioxide in the environment. Plants are the most important elements of oxygen and carbon cycle in the nature. They continue their activities in indoor spaces as well. Therefore, plants have a potential to be used for bettering indoor air quality as well as to be used for aesthetic purposes. Many previous studies revealed the potentials of plants to better air quality in the environment.

Furthermore, they may also have undesirable effects on the environments they are in as part of their biological cycle. However, it should be noted that this is something about the life cycle of plants. The harms caused by plants in the environments they are in mostly remain far too unimportant compared to their benefits. Any contrary situation stems from a mistake in planning. Plants have considerable influences on air quality in their surrounding environments; however, maybe the most important influence of plants on their surrounding environments is psychological. As a matter of fact, indoor plants relieve people psychologically, decrease stress and negative feelings, and increase productivity while reducing indoor air pollution (Cetin & Sevik 2016).

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Chapter 9

Evaluation of Open Space Utilization Opportunities of University Campuses in the Aspect of Physical Disabled People: Case of Karadeniz Technical University Campus

Ertan DÜZGÜNEŞ*, Mehtap ERDOĞAN**

INTRODUCTION

"If you plan cities for *cars* and traffic, you get *cars* and traffic. *If you plan* for people and places, *you get people and places."*

-Fred Kent-

Public spaces are shared areas that are intended for the common good of the present-day societies. Taking into consideration the Universal Declaration of Human Rights and the Constitution of Republic of Turkey, every human being has the equal rights and freedom to benefit from the public spaces. However, the disabled individuals, who constitute a substantial part of the population, cannot equally make use of the opportunities social life offers due to a number of factors. Given approximately 15% of the world population is made up of disabled people (Anon, 2011), it is an undeniable fact that disabled individuals are supposed to be in every part of life.

The notion of disability is defined as the defects on physical or cognitive abilities one experiences in his/her personal or social life that are caused by some sort of inability or impairment, which may be inherent in nature or occur later throughout the life (TDK, 2014; Yıldız, 2003; Koca, 2010). Disability is descried in the Convention on the Rights of Persons with Disabilities, which was also signed by Turkey in 2009, by stressing the social side of the disabled individuals. According to the Convention, disabled individuals are those who suffer from physical, cognitive, intellectual, mental, sensory, developmental, disability that result in restrictions on an individual's ability to actively participate to the fullest in their everyday society (Engelli Haklarına İlişkin Sözleşme, 2009). The western world extended the term of disability from the area of medicine, and developed a new discourse that focuses on the systematic struggle of the disabled individuals against social and cultural restrictions (Burcu, 2015). As a result of this, there are descriptions that perceive disability as the failure and restriction of the social human being. According to such definitions, disability connotes the disregard of the individual within the social system, and conversion of the existing disability to a general social restriction by paying minimum attention to the disabled individual (Oliver, 1996; Burcu, 2015).

Types of disability that disabled individuals suffer from include orthopedic, lingual and articulatory, auditory, visual and cognitive disabilities. Regardless of the type of

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disabilities they have, these individuals encounter many physical and social restrictions within the societies they live. Numerous countries, including Turkey, have enacted many legislative regulations in favor of the rights of disabled people. Especially the USA and England lead the world in this issue (Alp, 2014). The USA is the first country to introduce standards about accessibility for the disabled (Hacıhasanoğlu & Hacıhasanoğlu, 1997). Convention on the Rights of Persons with Disabilities, on the other hand, defined accessibility in the broadest sense (Çağlar, 2012). In Turkey, Administration for the Disabled People was founded in 1997, and standards relating the maintenance of accessibility for the disabled individuals to the physical environment and turning it into a more habitable place were included in the Zoning Law no 3914. Additionally, the first Council for the Disabled formed in 1999 and the legislative regulations known as the Law for the Disabled enacted in 2005 (Özgökçeler & Alper, 2010) clearly indicate the level of attention and care for the rights of individuals with disabilities. The underlying goal for all the above mentioned regulations is to enable the disabled individuals actively and equally benefit from the buildings, roads, parks and other elements of physical environment along with other individuals. In other words, the physical environment must be accessible for the disabled members of the society (Sirel *et al.,* 2012). Unfortunately, scrutinizing the open areas of public spaces reveals that they bear many restrictions not only for the disabled individuals but for the normal people as well. Thus, it can be possible to adapt the disabled to the social life with normal individuals only by eliminating the restrictions that exist in the physical environment surrounding them.

Apart from economic indicators, the level of development of societies ascends in parallel with the rate of participation of the disabled members to the common life. Such that, an understanding of planning that takes all the components constituting the society into account underlies the ideal of the inclusive society (Karakaş, 2007). According to the data of the Turkish Statistical Institute for the year 2002, 12.29% of the population of Turkey leads their lives with some sort of physical, auditory, visual, lingual and articulatory, and cognitive disabilities (DİE, 2002). With the increasing number of disabled people, certain changes have occurred in the perception and behaviors of other people towards the disabled individuals, and the problems they experience started to be brought up. The leading problem the disabled face is the restriction of their access to open places in the public spaces.

Turkish Standards Institute introduced several standards regarding accessibility in Turkey. Among these, standard no TS12576 defines the standards about the accessibility features of open spaces (TS 9111, 1999). Accessibility is defined as the utilization of services provided under normal functional conditions and the physical environment with ease by individuals perceived either physically or mentally disabled (Anon, 2001; Dikmen, 2011; Çınar, 2011). Access of all the individuals to open spaces can only be maintained by re-arranging these open spaces into 'unrestricted spaces'. It is a non-negligible fact that disabled individuals cannot fully benefit from the open spaces as a result of problems deriving from nonstandard designs and design flaws. Nonstandard pavements and stairs, over-inclined planes, mistakes made in preference of paving materials, faulty- positioned urban fittings and public transport stops and plant elements causes the isolation of disabled individuals from the society; hence, they cannot live under same conditions equally with other people. Consequently, open spaces are re-arranged again and again as they cannot maintain the mobility of individuals by meeting their needs at the minimum level.

University campuses, which have both public and autonomous features, include open and closed spaces where accommodation, transportation etc. services are provided and social and cultural activities are performed, along with educational processes. Depicting social development level, these spaces portray financial, demographic and physical facts. This, in turn, directly affects the relationship between the user and campus (Schuetz, 2007). Even though there are many standards in university campus planning regulations regarding the disabled individuals both in Turkey and around the world, these standards are generally neglected in the implementation phase. As a result of this, disabled individuals retreat from the social utilization areas, which hinders their opportunity to receive education equally with other people. Thus, circulation and transportation systems connecting open spaces should be designed compliant with certain design rules in accordance with defined planning standards in order to enhance the utilization of a disabled person from the these spaces.

In the current study, open space utilization means located within Karadeniz Technical University campus are evaluated for accessibility of physically disabled individuals. In this respect, the parameters identified for the field of study (pavements, planes, stairs, parking lots, public transportation stops, building entrances, signboards, urban fittings, paving elements) are compared against Regulation No: TS 12576 on Intra-City Roads- Structural Precautions to be taken on Streets, Avenues, Squares and Roads for the Disabled and Elderly Individuals and Design Rules for Signs, and further evaluations are made. Solutions for accessibility-related problems are proposed in the light of the data gathered in the scope of the study.

MATERIALS AND METHODS

Open spaces located on the heavily used main access route to Karadeniz Technical University (KTU) campus and areas with close interaction with this route constitute the field of study. A field study based on observation was conducted to detect the opportunities of area usage of the physically disabled individuals and the current problems. In order to clearly demonstrate the status of accessibility, the determined route was divided into 3 axes.

These axes are (Fig 1);

- University Entrance (Gate A) – Faik Ahmet Barutçu Library Axis
- Faculty of Letters – Faculty of Architecture Axis
- Department of Geomatics Engineering – University Entrance (Gate D) Axis

Separate identity cards were created for each axis, and parameters of pavements, planes, stairs, parking lots, public transportation stops, building entrances and signboards were evaluated in accordance with the standards prescribed in the Regulation No TS 12576: on Intra-City Roads- Structural Precautions to be taken on Streets, Avenues, Squares and Roads for the Disabled and Elderly Individuals and Design Rules for Signs. Then, every parameter was scored between “-1 and +1”. “-1” indicates the relevant parameter does not exist, “0” indicates the relevant parameter does not conform to standards, and “+1” indicates the relevant parameter conforms to standards. In this way, the conformity level of every parameter was detected in respect to accessibility. The scores of each parameter about the conformity levels were then divided into the maximum score they could get, and accordingly, general conformity level of each axis was identified in percentages. In the last phase, general conformity levels of the 3 axes were added together to determine the general conformity level of the field of study in terms of accessibility.

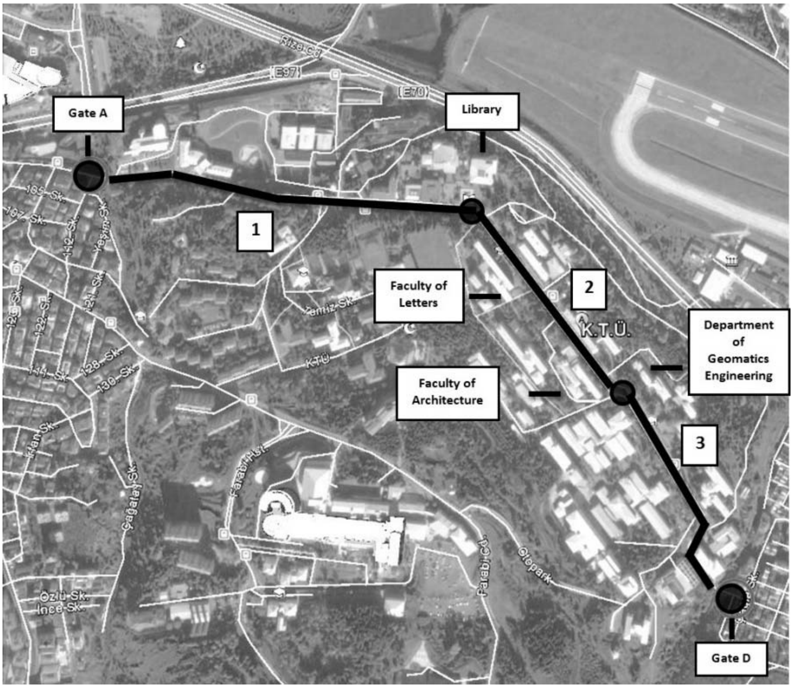

Figure 1: General view of the study area

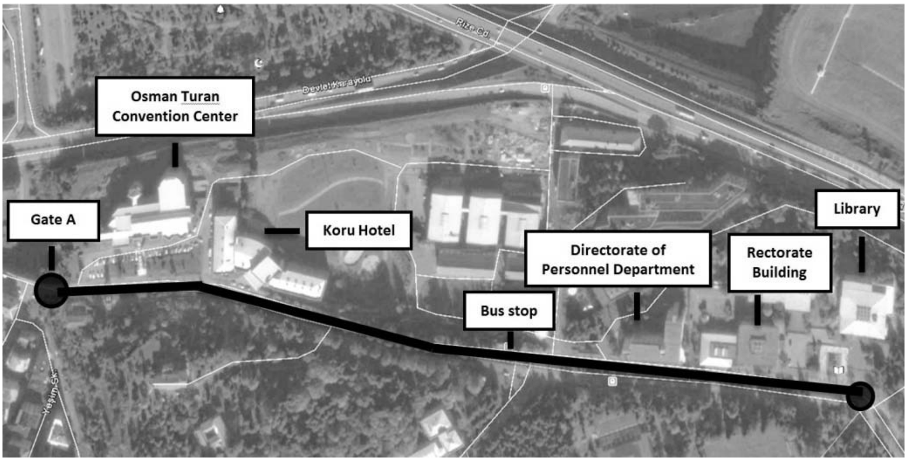

Figure 2: Axis no: 1

RESULTS
Axis No:1

Parameters determined in both directions on the +700-meter axis that lies between Gate A, the main entrance of the university campus, and Faik Ahmet Barutçu Library were examined. Along the axis stand Gate A (I), Osman Turan Convention Center (II), Koru Hotel (III), Directorate of Personnel Department (IV), Rectorate Building (V), Ahmet Faik Barutçu Library (VI), and one bus stop with close interaction with the axis (Fig 2).

Data about the parameters examined along Axis No: 1 are presented in Table 1.

Table 1: Parameters of axis no: 1 and measurements

UNIVERSITY ENTRANCE (GATE A)-FAİK AHMET BARUTÇU LIBRARY AXIS							
Parameters	**Standard Measurement**	**I**	**II**	**III**	**IV**	**V**	**VI**
Pavements							
Width	≥ 150 cm	630 cm	360 cm	240 cm	550 cm	720 cm	550 cm
Height	≥ 3 cm and ≤ 15 cm	22 cm	22 cm	15 cm	15 cm	15 cm	15 cm
Transverse slope	≤ 2%	1.4%	1.8%	1.8%	1.2%	1%	1%
Longitudinal slope	≤ 5%	9.2%	13.5%	13.7%	6.8%	1%	1%
Joint Gap	≥ 5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm
Paving material	Nonslip material	Confor-mant	Confor-mant	Confor-mant	Confor-mant	Confor-mant	Confor-mant
Afforestation	Not applied on pavements smaller than 200 cm	Confor-mant	Confor-mant	Non-confor-mant	Confor-mant	Confor-mant	Confor-mant
Thorny and Fructifying plants	Not applicable	Confor-mant	Confor-mant	Non-confor-mant	Confor-mant	Confor-mant	Confor-mant
Tree roots	Must have grating or be graveled; Width: 60 cm, Height: 10 cm	-	-	W: 60 cm H: 5 cm	W: 140 cm H: 14 cm	W: 140 cm H: 14 cm	W: 140 cm H: 14 cm
Electricity, lighting, sign boards	On the same level with the curbstone (75 cm - 120 cm)	40 cm	40 cm	50 cm	100 cm	110 cm	110 cm
Planes							
Width	≥ 180 cm	-	-	170 cm	130 cm	570 cm	90 cm
Paving material	Smooth	-	-	Confor-mant	Confor-mant	Confor-mant	Confor-mant
Inclination	≤ 8%	-	-	11.5%	10%	4.8%	12%
Stairs							
Width	≥ 180 cm	630 cm	180 cm	1100 cm	330 cm	370 cm	-
Tread width	30 cm	100 cm	30 cm	48 cm	90 cm	30 cm	-
Riser height	≤ 15 cm	18 cm	15 cm	15 cm	13 cm	15 cm	-
Paving material	Rough, Nonslip	Non-confor-mant	Non-confor-mant	Non-confor-mant	Non-confor-mant	Non-confo-rmant	-
Building Entrances							
Stoop	Width: 120 cm Length: 150 cm	*	W: 450 cm L:1200 cm	W: 500 cm L: 1500 cm	W: 200 cm L: 200 cm	W: 320 cm L: 3000 cm	W: 620 cm L: 720 cm

Table 1. continued

UNIVERSITY ENTRANCE (GATE A)-FAİK AHMET BARUTÇU LIBRARY AXIS							
Parameters	**Standard Measurement**	**I**	**II**	**III**	**IV**	**V**	**VI**
Building Entrances							
Distance between the door and the plane	120 cm	*	-	900 cm	760 cm	130 cm	720 cm
Material	Rough, Nonslip	*	Non-confor-mant	Non-confor-mant	Non-confor-mant	Confor-mant	Confor-mant
Public Transportation Stops							
Getting on-off	Lower tread of the bus and the pavement must be level	Confor-mant	Confor-mant	Confor-mant	Confor-mant	Confor-mant	Confor-mant
Sitting benches	Must have grab bars	-	-	-	-	-	-
Information signs and symbols	220 cm above ground level	-	-	-	160 cm	160 cm	-
Information board in closed stops	Eye level; with large font size	Confor-mant	Confor-mant	Confor-mant	-	-	Confor-mant
Distance to buildings of access	≤ 30 m	230 m	210 m	130 m	620 m	970 m	210 m
Width	≥ 360 cm	360 cm	360 cm	360 cm	360 cm	360 cm	360 cm
Length	≥ 1600 cm	-	-	-	1600 cm	1600 cm	-
Parking Lot							
Distance to building entrances	≤ 25 m, preferably 10 m	-	-	18 m	45 m	72 m	22 m
Width	≥ 360 cm, advised 390 cm	-	-	-	Confor-mant	Confor-mant	-
By motor road	At least one International Symbol of Access (Accessible icon) should be placed	-	-	-	Confor-mant	Confor-mant	-
Number of places	1 place for the disabled in every 50 places	-	-	-	1	1	-
Directions for the parking lot	Accessible icon on the direction board, accessible icon parking board, accessible icon on the ground	-	-	-	Confor-mant	Confor-mant	-
Signboards							
If on the curbstone, distance to curbstone	≤ 30 cm	-	-	-	70 cm	70 cm	-

Table 1. continued

UNIVERSITY ENTRANCE (GATE A)-FAİK AHMET BARUTÇU LIBRARY AXIS							
Parameters	**Standard Measurement**	**I**	**II**	**III**	**IV**	**V**	**VI**
Signboards							
Height on the pedestrian pavement	220- 250 cm	-	-	-	190 cm	190 cm	-
Directions for the parking lot	250 cm	-	-	-	Conformant	Conformant	-

* Left out of assessment

Scores and levels of conformity regarding Axis No. 1 are presented in Table 2.

Table 2: Scores and levels of conformity regarding axis no: 1

LEVELS OF CONFORMITY OF UNIVERSITY ENTRANCE (GATE A)-FAİK AHMET BARUTÇU LIBRARY AXIS						
Parameters	**I**	**II**	**III**	**IV**	**V**	**VI**
Pavements						
Width	1	1	1	1	1	1
Height	0	0	1	1	1	1
Transverse slope	1	1	1	1	1	1
Longitudinal slope	0	0	0	0	1	1
Joint Gap	1	1	1	1	1	1
Paving material	1	1	1	1	1	1
Afforestation	1	1	0	1	1	1
Thorny and Fructifying plants	1	1	0	1	1	1
Tree roots	-1	-1	1	0	0	0
Electricity, lighting, sign boards	0	0	0	1	1	1
Scores	**5**	**5**	**6**	**8**	**9**	**9**
Planes						
Width	-1	-1	0	0	1	0
Paving material	-1	-1	1	1	1	1
Inclination	-1	-1	0	0	1	0
Scores	**-3**	**-3**	**1**	**1**	**3**	**1**
Stairs						
Width	1	1	1	1	1	-1
Tread width	0	1	0	0	1	-1
Riser height	0	1	1	1	1	-1
Paving material	0	0	0	0	0	-1
Scores	**1**	**3**	**2**	**2**	**3**	**-4**
Building Entrances						
Stoop	*	1	1	1	1	1
Distance between the door and the plane	*	-1	1	1	1	1
Material	*	0	0	0	1	1
Scores	*	**0**	**2**	**2**	**3**	**3**
Public Transportation Stops						
Getting on-off	1	1	1	1	1	1
Sitting benches	-1	-1	-1	-1	-1	-1

Table 2. continued

LEVELS OF CONFORMITY OF UNIVERSITY ENTRANCE (GATE A)-FAİK AHMET BARUTÇU LIBRARY AXIS						
Parameters	**I**	**II**	**III**	**IV**	**V**	**VI**
Public Transportation Stops						
Information signs and symbols	-1	-1	-1	0	0	-1
Information board in closed stops	1	1	1	-1	-1	1
Distance to buildings of access	0	0	0	0	0	0
Width	1	1	1	1	1	1
Length	-1	-1	-1	1	1	-1
Scores	**0**	**0**	**0**	**1**	**1**	**0**
Parking Lot						
Distance to building entrances	-1	-1	1	0	0	1
Width	-1	-1	-1	1	1	-1
By motor road	-1	-1	-1	1	1	-1
Number of places	-1	-1	-1	1	1	-1
Directions for the parking lot	-1	-1	-1	1	1	-1
Scores	**-5**	**-5**	**-3**	**4**	**4**	**-3**
Signboards						
If on the curbstone, distance to curbstone	-1	-1	-1	0	0	-1
Height on the pedestrian pavement	-1	-1	-1	0	0	-1
Directions for the parking lot	-1	-1	-1	1	1	-1
Scores	**-3**	**-3**	**-3**	**1**	**1**	**-3**
TOTAL SCORE	**-5/32**	**-3/35**	**5/35**	**19/35**	**24/35**	**3/35**
GENERAL TOTAL (%)						**20.77**

* Left out of assessment

Axis No:2

Department of Chemistry (I), Department of Physics (II), Faculty of Letters (III), Department of Architecture (IV), Stationery (V) and one bus stop are located on the $\pm$410-meter axis (Fig 3).

Data about the parameters examined along Axis No: 2 are presented in Table 3.

Scores and levels of conformity regarding Axis No: 2 are presented in Table 3.

Table 3: Parameters of axis no: 2 and measurements

FACULTYOF LETTERS-FACULTY OF ARCHITECTURE AXIS						
Parameters	**Standard Measurement**	**I**	**II**	**III**	**IV**	**V**
Pavements						
Width	≥ 150 cm	280 cm	280 cm	180 cm	400 cm	400 cm
Height	≥ 3 cm and ≤ 15 cm	15 cm	15 cm	15 cm	15 cm	15 cm
Transverse slope	≤ 2%	1.2%	1.2%	1.1%	1.4%	1.4%
Longitudinal slope	≤ 5%	1.1%	1.1%	1.3%	1.3%	1.3%
Joint Gap	≥ 5 mm	5 mm	5 mm	5 mm	5 mm	5 mm
Paving material	Nonslip material	Conformant	Conformant	Conformant	Conformant	Conformant
Afforestation	Not applied on pavements smaller than 200 cm	Conformant	Conformant	Conformant	Conformant	Conformant

Table 3. continued

FACULTYOF LETTERS-FACULTY OF ARCHITECTURE AXIS						
Parameters	**Standard Measurement**	**I**	**II**	**III**	**IV**	**V**
Pavements						
Thorny and Fructifying plants	Not applicable	Conformant	Conformant	Conformant	Conformant	Conformant
Tree roots	Must have grating or be graveled; Width: 60 cm, Height: 10 cm	-	-	-	-	-
Electricity, lighting, sign boards	On the same level with the curbstone (75 cm - 120 cm)	30 cm	30 cm	30 cm	100 cm	100 cm
Planes						
Width	≥ 180 cm	130 cm	130 cm	-	90 cm	180 cm
Paving material	Smooth	Conformant	Conformant	-	Conformant	Non-conformant
Inclination	≤ 8%	7.2%	16%	-	15%	14.8%
Stairs						
Width	≥ 180 cm	205 cm	-	-	420 cm	-
Tread width	30 cm	30 cm	-	-	30 cm	-
Riser height	≤ 15 cm	15 cm	-	-	15 cm	-
Paving material	Rough, Nonslip	Conformant	-	-	Conformant	-
Building Entrances						
Stoop	Width: 120 cm, Length: 150 cm	E: 250 cm B: 360 cm	E: 300 cm B: 400 cm	E: 240 cm B:860 cm	E: 420 cm B: 620 cm	E: 410 cm B: 560 cm
Distance between the door and the plane	120 cm	250 cm	1300 cm	-	580 cm	700 cm
Material	Rough, Nonslip	Conformant	Non-conformant	Conformant	Conformant	Conformant
Public Transportation Stops						
Getting on-off	Lower tread of the bus and the pavement must be level	Conformant	Conformant	Conformant	Conformant	Conformant
Sitting benches	Must have grab bars	-	-	-	-	-
Information signs and symbols	220 cm above ground level	-	-	-	-	-
Public Transportation Stops						
Information board in closed stops	Eye level; with large font size	Conformant	Conformant	Conformant	Conformant	Conformant

Table 3. continued.

FACULTYOF LETTERS-FACULTY OF ARCHITECTURE AXIS						
Parameters	**Standard Measurement**	**I**	**II**	**III**	**IV**	**V**
Public Transportation Stops						
Information board in closed stops	Eye level; with large font size	Conformant	Conformant	Conformant	Conformant	Conformant
Distance to buildings of access	≤ 30 m	80 m	129 m	182 m	148 m	141 m
Width	≥ 360 cm	360 cm	360 cm	360 cm	360 cm	360 cm
Length	≥ 1600 cm	-	-	-	-	-
Parking Lot						
Distance to building entrances	≤ 25 m, preferably 10 m	62 m	25 m	10 m	6 m	-
Width	≥ 360 cm, advised 390 cm	-	-	-	-	-
By motor road	At least one International Symbol of Access (Accessible icon) should be placed	-	-	-	-	-
Number of places	1 place for the disabled in every 50 places	-	-	-	-	-
Directions for the parking lot	Accessible icon on the direction board, accessible icon parking board, accessible icon on the ground	-	-	-	-	-
Signboards						
If on the curbstone, distance to curbstone	≤ 30 cm	-	-	-	-	-
Height on the pedestrian pavement	220- 250 cm	-	-	-	-	-
Directions for the parking lot	250 cm	-	-	-	-	-

Table 4: Scores and levels of conformity regarding axis no: 2

LEVEL OF CONFORMITY OF FACULTY OF LETTERS-FACULTY OF ARCHITECTURE AXIS					
Parameters	**I**	**II**	**III**	**IV**	**V**
Pavements					
Width	1	1	1	1	1
Height	1	1	1	1	1
Transverse slope	1	1	1	1	1
Longitudinal slope	1	1	1	1	1
Joint Gap	1	1	1	1	1
Paving material	1	1	1	1	1
Afforestation	1	1	1	1	1
Thorny and Fructifying plants	1	1	1	1	1
Tree roots	-1	-1	-1	-1	-1
Electricity, lighting, sign boards	0	0	0	1	1
Scores	**7**	**7**	**7**	**8**	**8**
Planes					
Width	0	0	-1	0	1
Paving material	1	1	-1	1	0
Inclination	1	0	-1	0	0
Scores	**2**	**1**	**-3**	**1**	**1**
Stairs					
Width	1	-1	-1	1	-1
Tread width	1	-1	-1	1	-1
Riser height	1	-1	-1	1	-1
Paving material	1	-1	-1	1	-1
Scores	**4**	**-4**	**-4**	**4**	**-4**
Building Entrances					
Stoop	1	1	1	1	1
Distance between the door and the plane	1	1	-1	1	1
Material	1	-1	1	1	1
Scores	**3**	**1**	**1**	**3**	**3**
Public Transportation Stops					
Getting on-off	1	1	1	1	1
Sitting benches	-1	-1	-1	-1	-1
Information signs and symbols	-1	-1	-1	-1	-1
Information board in closed stops	1	1	1	1	1
Distance to buildings of access	0	0	0	0	0
Width	1	1	1	1	1
Length	-1	-1	-1	-1	-1
Scores	**0**	**0**	**0**	**0**	**0**
Parking Lot					
Distance to building entrances	0	1	1	1	-1
Width	-1	-1	-1	-1	-1
By motor road	-1	-1	-1	-1	-1
Number of places	-1	-1	-1	-1	-1
Directions for the parking lot	-1	-1	-1	-1	-1
Scores	**-4**	**-3**	**-3**	**-3**	**-5**
Signboards					
If on the curbstone, distance to curbstone	-1	-1	- 1	-1	-1
Height on the pedestrian pavement	-1	-1	-1	-1	-1

Table 4. continued

LEVEL OF CONFORMITY OF FACULTY OF LETTERS-FACULTY OF ARCHITECTURE AXIS					
Parameters	**I**	**II**	**III**	**IV**	**V**
Signboards					
Directions for the parking lot	-1	-1	-1	-1	-1
Scores	**-3**	**-3**	**-3**	**-3**	**-3**
TOTAL SCORE	**9/35**	**-1/35**	**-5/35**	**10/35**	**0/35**
GENERAL TOTAL (%)					**7.43**

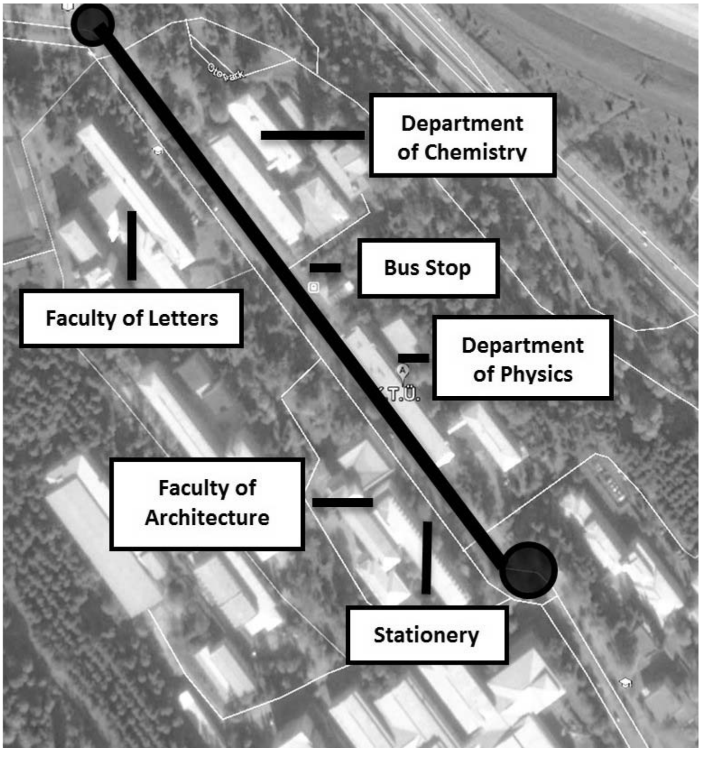

Figure 3: Axis no: 2

Axis No: 3

Department of Geomatics Engineering (I), Department of Geology Engineering (II), Department of Forestry Engineering (III), Department of Forestry-Industrial Engineering (IV), Department of Electrics and Electronics Engineering and Department of Computer Engineering (V), ATMs (VI) University Entrance Gate D (VII) and one bus stop are located on the ±420-meter axis (Fig 4).

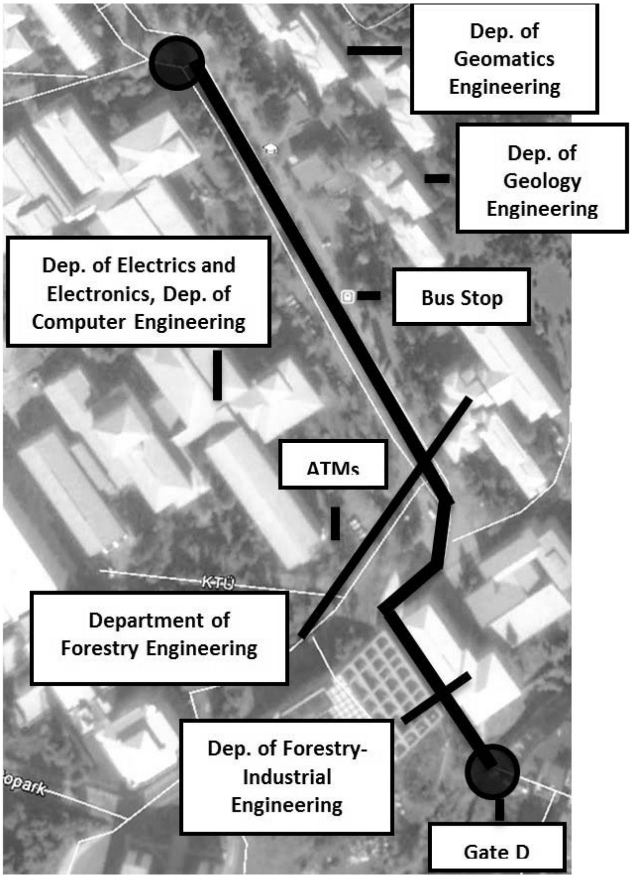

Figure 4: Axis no: 3

Data about the parameters examined along Axis No: 3 are presented in Table 5.

Table 5: Parameters of axis no: 3 and measurements

DEPARTMENT OF GEOMATICS ENGINEERING – UNIVERSITY ENTRANCE (GATE D) AXIS								
Parameters	**Standard Measurement**	**I**	**II**	**III**	**IV**	**V**	**VI**	**VII**
Pavements								
Width	≥ 150 cm	350 cm	630 cm	630 cm	240 cm	290 cm	390 cm	240 cm
Height	≥ 3 cm and ≤ 15 cm	25 cm	15 cm	15 cm	15 cm	15 cm	15 cm	15 cm
Transverse slope	≤ 2%	0.8%	1%	1%	1%	0.8%	0.8%	1%
Longitudinal slope	≤ 5%	1.3%	1.2%	1.2%	2%	1.2%	1.3%	2%
Joint Gap	≥ 5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm
Paving material	Nonslip material	Confor-mant	Confor-mant	Confor-mant	Confor-mant	Confor-mant	Confor-mant	Confor-mant
Afforestation	Not applied on pavements smaller than 200 cm	Non-confor-mant	Confor-mant	Confor-mant	-	-	-	-

Thorny and Fructifying plants	Not applicable	Confor-mant	Confor-mant	Confor-mant	-	-	-	-
Tree roots	Must have grating or be graveled; Width: 60 cm, Height: 10 cm	G: 120 cm Y: 10 cm	G: 170 cm Y: 10 cm	G: 170 cm Y: 10 cm	-	-	-	-
Electricity, lighting, sign boards	On the same level with the curbstone (75 cm - 120 cm)	90 cm	90 cm	90 cm	-	90 cm	90 cm	-
Planes								
Width	≥ 180 cm	-	-	170 cm	90 cm	-	-	125 cm
Paving material	Smooth	-	-	Conformant	Conformant	-	-	Conformant
Inclination	≤ 8%	-	-	18%	21%	-	-	19%
Stairs								
Width	≥ 180 cm	400 cm	500 cm	700 cm	400 cm	570 cm	330 cm	400 cm
Tread width	30 cm	30 cm	30 cm	30 cm	30 cm	30 cm	30 cm	30 cm
Riser height	≤ 15 cm	15 cm	15 cm	15 cm	15 cm	15 cm	15 cm	15 cm
Paving material	Rough, Nonslip	Confor-mant	Confor-mant	Confor-mant	Confor-mant	Confor-mant	Confor-mant	Confor-mant
Building Entrances								
Stoop Distance between the door and the plane	Width: 120 cm Length: 150 cm	W: 450 cm L: 720 cm	W: 220 cm L: 650 cm	W: 240 cm L: 650 cm	W: 500 cm L: 2750 cm	W: 650 cm L: 650 cm	*	*
Material	120 cm	-	-	-	2750 cm	-	*	*
Stoop	Rough, Nonslip	Confor-mant	Non-confor-mant	Non-confor-mant	Non-confor-mant	Non-confor-mant	*	*
Public Transportation Stops								
Getting on-off	Lower tread of the bus and the pavement must be level	Confor-mant	Confor-mant	Confor-mant	Confor-mant	Confor-mant	Confor-mant	Confor-mant
Sitting benches	Must have grab bars	-	-	-	-	-	-	-
Information signs and symbols	220 cm above ground level	-	-	-	-	-	-	-
Information board in closed stops	Eye level; with large font size	Confor-mant	Confor-mant	Confor-mant	Confor-mant	Confor-mant	Confor-mant	Confor-mant
Distance to buildings of access	≤ 30 m	135 m	57 m	58 m	122 m	70 m	14.5 m	152 m
Width	≥ 360 cm	360 cm	360 cm	360 cm	360 cm	360 cm	360 cm	360 cm
Length	≥ 1600 cm	-	-	-	-	-	-	-

Table 5: Continued

Parking Lot								
Distance to building entrances	≤ 25 m, preferably 10 m	-	27 m	43m	5 m	25 m	49 m	-
Width	≥ 360 cm, advised 390 cm	-	-	-	-	-	-	-
By motor road	At least one International Symbol of Access (Accessible icon) should be placed	-	-	-	-	-	-	-
Number of places	1 place for the disabled in every 50 places	-	-	-	-	-	-	-
Directions for the parking lot	Accessible icon on the direction board, accessible icon parking board, accessible icon on the ground	-	-	-	-	-	-	-
Signboards								
If on the curbstone, distance to curbstone	≤ 30 cm	-	-	-	-	-	-	-
Height on the pedestrian pavement	220- 250 cm	-	-	-	-	-	-	-
Directions for the parking lot	250 cm	-	-	-	-	-	-	-

* Left out of assessment

Scores and levels of conformity regarding Axis No: 3 are presented in Table 6.

Table 6: Scores and levels of conformity regarding axis no: 3

LEVELS OF CONFORMITY OF DEPARTMENT OF GEOMATICS ENGINEERING – UNIVERSITY ENTRANCE (GATE D) AXIS							
Parameters	**I**	**II**	**III**	**IV**	**V**	**VI**	**VII**
Width	1	1	1	1	1	1	1
Height	0	1	1	1	1	1	1
Transverse slope	1	1	1	1	1	1	1
Longitudinal slope	1	1	1	1	1	1	1
Joint Gap	1	1	1	1	1	1	1
Paving material	1	1	1	1	1	1	1
Afforestation	0	1	1	-1	-1	-1	-1
Thorny and Fructifying plants	1	1	1	-1	-1	-1	-1
Tree roots	1	1	1	-1	-1	-1	-1
Electricity, lighting, sign boards	1	1	1	-1	1	1	-1
Scores	**8**	**10**	**10**	**6**	**6**	**6**	**6**
Planes							
Width	-1	-1	0	0	-1	-1	0
Paving material	-1	-1	1	1	-1	-1	1
Inclination	-1	-1	0	0	-1	-1	0
Scores	**-3**	**-3**	**1**	**1**	**-3**	**-3**	**1**

Table 6: Continued

Stairs							
Width	1	1	1	1	1	1	1
Tread width	1	1	1	1	1	1	1
Riser height	1	1	1	1	1	1	1
Paving material	1	1	1	1	1	1	1
Scores	**4**	**4**	**4**	**4**	**4**	**4**	**4**
Building Entrances							
Stoop	1	1	1	1	1	*	*
Distance between the door and the plane	-1	-1	-1	1	-1	*	*
Material	1	0	0	0	0	*	*
Scores	**1**	**0**	**0**	**2**	**0**	*	*
Public Transportation Stops							
Getting on-off	1	1	1	1	1	1	1
Sitting benches	-1	-1	-1	-1	-1	-1	-1
Information signs and symbols	-1	-1	-1	-1	-1	-1	-1
Information board in closed stops	1	1	1	1	1	1	1
Distance to buildings of access	0	0	0	0	0	1	0
Width	1	1	1	1	1	1	1
Length	-1	-1	-1	-1	-1	-1	-1
Scores	**0**	**0**	**0**	**0**	**0**	**1**	**0**
Parking Lot							
Distance to building entrances	-1	0	0	1	1	0	-1
Width	-1	-1	-1	-1	-1	-1	-1
By motor road	-1	-1	-1	-1	-1	-1	-1
Number of places	-1	-1	-1	-1	-1	-1	-1
Directions for the parking lot	-1	-1	-1	-1	-1	-1	-1
Scores	**-5**	**-4**	**-4**	**-3**	**-3**	**-4**	**-5**
Signboards							
If on the curbstone, distance to curbstone	-1	-1	-1	-1	-1	-1	-1
Height on the pedestrian pavement	-1	-1	-1	-1	-1	-1	-1
Directions for the parking lot	-1	-1	-1	-1	-1	-1	-1
Signboards							
Scores	**-3**	**-3**	**-3**	**-3**	**-3**	**-3**	**-3**
TOTAL SCORE	**2/35**	**4/35**	**8/35**	**7/35**	**1/35**	**1/32**	**3/32**
GENERAL TOTAL (%)							**10.88**

* Left out of assessment

Upon calculation and addition of the level of conformity of each axis as the result of assessments done, general conformity level of Karadeniz Technical University campus in terms of accessibility was found to be 39.08%.

DISCUSSION AND CONCLUSION

About 8.5 million disabled citizens live in Turkey. On the Karadeniz Technical University campus, on the other hand, there are 57 personnel and 34 students with physical disabilities. Disabled individuals can isolate themselves from the public spaces due to restrictions they face throughout their lives as a result of several physical and social factors. According to Kahraman (2014), most of the public spaces are built merely for watching from a distance, rather than attaining something functional. Hence, such spaces are clean and vacant areas, which are neatly designed but have nobody to use.

There exist standards relating the disabled introduced thorough laws and regulations in Turkey. However, in the implementation phases, these standards are almost always ignored, or partially adopted. As a result of that, the inequality gap between individuals with and without disabilities is expanding day by day.

University campuses, which are among heavily used public spaces, are no exception to this fact. University campuses are structured spaces, and planning structured spaces without human beings inside causes many difficulties when used. Restructuring, which will eventually be more advantageous to everyone in the long run, is usually perceived as a cause of waste of time and money.

In the current study, through which we evaluated the accessibility for the disabled individuals, Karadeniz Technical University was dived into 3 axes, and each axis was assessed in accordance with Regulation No: TS 12576 on Intra-City Roads- Structural Precautions to be taken on Streets, Avenues, Squares and Roads for the Disabled and Elderly Individuals and Design Rules for Signs. The evaluation made revealed that:

- Gate A does not conform to standards for almost any parameter, especially in terms of accessibility for the disabled individuals on the wheelchair. Yet, Gate D portrays a different picture in this sense. Both gates are located far away from the parking lots and public transportation stops.
- In all of the axes, most of the pavements conform to the standards. However, most of the pedestrian pavements lack pavement planes. The existing ramps, on the other hand, do not conform to the standards. Therefore, they need to be reconstructed taking the standards into account, and continuity of pavement-planes should be maintained throughout the axes. Nonslip and rough tiles, concrete plates and paving stones were used as paving materials. Joint gaps do not pose any troubles for wheelchair users, but the height of the pavement ran reach up to 25 cm in some sections. The height of motor road and the pavements need to be readjusted in those sections. Plantation made on the axis where Koru Hotel is located hinders not only the disabled but the normal individuals as well because the implementation extends to the middle of the pavement. This route must be revised and rearranged.
- As entrances of the departments are located at different elevations, these buildings can only be reached through stairs. However, most of the stairs lack planes. Planes are integrated only with the stoops. Thus, required planes conformant to standards must urgently be built on the faulty staircases. Besides, we did not encounter any stoop of 200 cm, which is a must for any staircase that has more than 12 stairs.
- Entrances of the buildings are generally paved with polished travertine, which is a slippery material. These places, which pose particular safety risks for walking especially when it is rainy and snowy, must be rebuilt by using a suitable paving material. ATMs can be accessed through stairs. Even if the stairs are conformant to standards, they lack planes for the use of disabled individuals on wheelchairs.
- There is one marked bus stop on all three axes. Despite the fact that the equal proximity to all the nearby buildings was taken into account when positioning the stops, only one of them is suitable for the disabled users in accordance with the laid standards. There are neither any signs nor symbols on the bus stops, but the existing signboards are placed on the eyelevel and font sizes are large enough. Sitting benches lack grab bars. Moreover, these stops do not have a spare area large enough to house public transportation vehicles. Therefore, existing stops should be re-designed and more spots should be allocated for new public transportation stops.

• Unfortunately, parking spaces for each vehicle are not marked with lines or other forms of separators, except for the parking lot of the Rectorate Building and Directorate of Personnel Department. They also lack the required signs and direction boards. Furthermore, there are no parking spaces allocated for disabled drivers except for the parking lot of the Rectorate Building and Directorate of Personnel Department. Additionally, drivers are forced to park their cars by the road, as the existing parking spaces fail to meet the need. All in all, taking into consideration the needs of personnel working at departments and administrative buildings - and of course – the disabled individuals, parking spaces must be rearranged.

• It is surprising that almost the whole campus area lacks signs, symbols or direction boards addressed explicitly to the disabled individuals.

According to the findings of the current study, the conformity level of Karadeniz Technical University campus in respect to accessibility was found to be 39.08%. Taking the existing standards into account, it is inferred that the campus area fail to meet the standards in terms of accessibility and design features. This is a clear indicator that physically disabled individuals are experiencing several problems in "access". In order to ensure that all members of the society live equally and access all the social opportunities, new spaces and environments where restrictions are removed should be created.

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Chapter 10

Seating Furniture in Open Spaces and Their Contribution to the Social Life

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INTRODUCTION

According to Berleant (1988) cities can be seen as opportunities for experiencing different social groups and customs. A city's public open spaces which are defined as outdoor spaces with free access for people, such as bazaar, parks, streets, pedestrian paths, plazas, and squares (Nasution & Zahrah, 2012) are the places where people meet to exchange ideas, trade, or simply relax and enjoy themselves (Gehl, 2010). Public open spaces are one aspect of the urban environment that is of great importance in daily life for people who live in urban areas (Woolley, 2003). The importance of public open spaces which is confirmed by the large numbers of people who use urban open spaces and the value that people attribute to them, lies in the many different benefits and opportunities that they can provide (Hernandez Garcia, 2013).

Public open spaces provide many functions and substantial benefits which meet human needs. These functions can be grouped as; enrichment of social life, enhancing the image of the city, improving urban landscape and physical environment, and providing economical support. In this study we will focus on enrichment of social life and will discuss its relation to stationary activities and design of seating areas. Since humans are social creatures by their nature and need to contact with other people, the connections between the individual and social groups are important for both individual's and social system's health (Fitzpatrick & LaGory, 2000). In this regard public open spaces have two main functions: while in open spaces people feel that they are connected to a larger social system and these spaces serve as gathering places for people to communicate with each other. If cities and neighbourhoods have advanced public open spaces, residents will build a strong sense of community. Researchers suggest that relations to other people, spaces and events contribute to sense of familiarity and attachment to society. The places that help to construct society's attitudes, and provide continuity from past to present gain importance for residents and obtain a social value and meaning (Project for Public Space, 2000; Chang, 2002; Mehta, 2007).

Public open space is successful when it becomes a conducive place for social interaction, attracts many visitors to do their activities in there, with a wide range of activities occur, individual or group, informal and suitable for recreation, democratic and non discriminative, accessible for all class and age of people, including disable people and informal sector (Whyte, 1980; Rivlin, 1994; Project for Public Space, 2000; Nasution & Zahrah, 2012). Variations in the activities of people in different social

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classes, at different life cycle stages, and of different ethnic and regional groups comprise as an important social factor for open public spaces (Abu-Ghazzeh, 1996). These factors create vitality which is seen as an indicator of a safer, more desirable, and more attractive space and has the capacity for offering more choices for social activities (Jalaladdini & Oktay, 2012). Therefore creating public open spaces with high level of use which provide vitality with various activities and different user groups is necessary and crucial. When public open spaces do not function successfully, they will lose all their benefits and value. In recent years various studies which aimed to determine the design criteria of public open spaces, or spatial attributes, users and use types were conducted the spatial attributes of successful and unsuccessful public spaces and the relations of their users to their surroundings were determined. One of the mostly cited issues in public life studies is the relationship between socialization and stationary activities or passive engagement in public open spaces. For the vitality of public open spaces, spatial attributes that afford these activities are of importance. Especially occurrence of activities like standing, sitting, and leaning pave the way for social activities such as conversation, watching around and passengers, watching a street show with other people etc. For this reason spatial attributes which provides affordances for sitting and leaning are cited frequently in the studies (Whyte, 1980; Gehl, 1987, 2010; Cooper Marcus & Francis, 1998; Project for Public spaces, 2000; Francis, 2003).

1. The Social Value of Public Open Spaces

According to Mehta (2014) good public space is required for the social and psychological health of modern communities. For this reason the relationship between the quality of public spaces and the quality of life in cities was frequently mentioned by researchers. These studies underlines that high quality, well-designed public open space enhances quality of life in the public domain and brings successful urban life for the people, by this way affects the community's closeness and the city's livability, safety, sustainability and vitality (Cattell et al., 2008; Gehl, 2010; Jalaladdini & Oktay, 2012; Nasution & Zahrah, 2012; Farida, 2013; Tsitoura *et al.*, 2014; Lai *et al.*, 2014;).

Public open spaces are stages for displaying public life in which most of human communication and interactions take place (Carr *et al.*, 1992; Project for Public Space, 2000; Tibbalds, 2000). Gehl (1987) suggests that by meeting other people in public open spaces and through socialization people gain information of social world around them and of people by observing how others do work, behave, and dress. Through these information people develop more strong ties with the surrounding world (Gehl, 1987). Public open spaces are shared by strangers thus different people with different religions, and cultural and political values coexist (Arefi & Meyers, 2003). There is a shared consensus that interactions among strangers are positive for building community cohesion (Simões Aelbrecht, 2016). Thomas (1991) highlighted the four social roles of public space which are; as an arena for public life, as a meeting place for different social groups, as a space for the display of symbols and images in society and as a part of the communication system between urban activities (cited in Mehta, 2014).

High quality public open space was defined as responsive, democratic and meaningful (Mehta, 2014) considering human dimension (Gehl, 2010) providing comfort, relaxion, passive and active engagement, discovery, fun, and safety (Francis, 2003). Hernandez Garcia (2013) suggested that people's interaction with public spaces have two aspects: the functional which is understood as the physical and everyday usage of the space and the symbolic which is understood as the experiential and representational interaction. These interactions transform social relationships and generate different levels of attachment to and appropriation of the place (Hernandez Garcia, 2013).

Public space is intended to encourage sociability; these spaces provide opportunities for individuals to engage in high-level social interaction (Crankshaw, 2009; Farida, 2013). Madanipour (2003) defines sociability as performative exchange among strangers and as a main feature of the modern urban society. Social interaction a key element of community is enhanced by the presence of three variables: first is the opportunity for contact; second is proximity to others; and third is appropriate space to interact (Abu-Ghazzeh, 1999). Public open spaces are seen as part of a society's social capital, and means to be used in preventing social fragmentation and alienation (Madanipour, 2003).

Being part of social life, active or passive, meets various human needs and provides various benefits to the residents. Social ties provide support, confer esteem, a sense of belonging and identity, or facilitate social integration (Cattell et al., 2008; Matsuoka & Kaplan 2008). The most emphasized role of activities held in public open spaces is promoting one's sense of community; public open space is defined as a key arena for this function (Abu-Ghazzeh, 1999; Madanipour, 2003; Woolley, 2003; Cattell et al., 2008). Gehl (2010) sees the public open space as a meeting place which creates opportunity for democratic exchanges thus, serves a democratic function where people encounter social diversity and gain a greater understanding of each other by sharing the same city space. Madanipour's (2003) detailed explanations provide a deeper understanding of social benefits of public open spaces. For him, public open space is a place of simultaneity, a site for display and performance, an exploration of difference and identity, an arena for recognition, in which representation of difference can lead to an awareness of the self and others. It is a place where many-sided truths co-exist and tolerance of different opinions is practiced, where symbols are presented and exchanged. By being present in the same place with others, shared experience of the world becomes possible and a link is made with previous generations who experienced (or future generations who might experience) the same physical reality. He concluded that this connecting role that bridges time endows public space with permanence (Madanipour, 2003). Fassi and Motter (2014) emphasized a different dimension of public spaces as they are becoming places of social innovation, offering a context where creative communities act to bring original solutions to everyday problems that the current economic system is no longer able to provide.

How are public open spaces being used by people in order to gain these benefits, what kind of activities takes place in them? Public places meet the diverse needs of diverse users. People's public life occurs in public open spaces in a complex set of forms and functions; accordingly, these spaces must be capable to contain diverse behaviour, uses and activities such as shopping, walking, and sitting, conversation, using the facilities to entertain, relax or even passing the time as daily activities, and also periodic festivities and events. They have to afford people various activities; otherwise, parts of the society will be pushed out of the public realm which results in serious limitations for the daily lives of people. As such, public spaces affect people's quality of life (Jalaladdini & Oktay, 2012). In other words the city with its public open spaces must be inclusive and there must be room for everyone (Gehl, 2010). Gehl

(2010) emphasized that it is a significant quality that all groups of society, regardless of age, income, status, religion or ethnic background, can meet face to face in city space as they go about their daily business. In his study Abu-Ghazzeh (1999) determined that opportunities for meeting and daily activities enabled one to see, and to hear others, to experience other people functioning in various situations. The modest 'see and hear contacts' must be considered in relation to other forms of contact and as part of the whole range of social activities (Abu-Ghazzeh, 1999). Gehl (2010) named these as passive contacts, which are opportunities to simply see and hear life in the city. To see and be seen is the simplest and by far the most widespread form of meeting between people (Gehl, 2010). Through basic activities such as walking, stopping, sitting and meeting others, others are elaborated: building social relationships, expressing individual and community traditions and beliefs, and developing political ideas and concerns. These, however, are interrelated with more functional usages of open spaces such as economic and recreational activities; and all of them contribute to building experiential and symbolic meanings (Hernandez Garcia, 2013).

To sum up active and passive activities in public open spaces such as meeting friends and strangers, walking, shopping, sitting, conversation, relaxing, watching daily activities etc., provides sociability which enhances people's interaction with society and space. High level of sociability is important for its crucial social benefits for society such as promoting one's sense of community, creating opportunity for democratic exchanges etc. Therefore understanding the relationship between sociability and occurring activities is compulsory. How socialization is promoted in public open spaces, what are the spatial attributes that affords these activities must be determined. In the following section the researches that dealt with this issue and their finding on stationary activities in public open spaces will be discussed.

2. Sitting Behavior in Public Open Spaces and Contributions to Social Life

In order to improve our designs in the future, it is important to understand how people use space (Abu-Ghazzeh, 1996). Thompson (2013) similarly suggested that designers need to understand both what is necessary and what is sufficient to encourage active outdoor use, and research needs to tease apart the strength or importance of these varying factors for different groups or individuals. The researches focused on issues such as the quality of public open spaces, their usability and success ask similar questions; what makes a public open space great? Why many public spaces fail (Project for Public Spaces, 2000)? Why some public open space work and other do not? What makes a successful public space (Francis, 2003)? Why some public open space do work for people, and some do not? Why some of them are frequently used and some other are nearly empty (Whyte, 1980)? What makes a public space a pleasant place to be and thus used (Gehl & Svarre 2013)?

Whyte (1980), pioneer of the studies that aimed to identify frequently used, livable public open spaces, conducted a research with "The Street Life Project" team in 1970 and one of the striking finding is that many public open space were lacking crowding. They observed that while few of the spaces were jammed, most of them were nearly empty. Why some of them were working well but some other was not? The researchers conducted a study depending on this observation (Whyte, 1980). The findings showed that the best-used plazas were sociable places, with a higher proportion of couples than in less-used places, more people in groups, and more people meeting people or exchanging goodbyes. Whyte (1980) suggested that a high proportion of people in groups are an index of selectivity, when people go to a place in twos or trees or rendezvous there, it is most often because they have decided to.

Physical features of the public space influence the extent and character of outdoor activities and defined as efficient design elements in outdoor spaces to encourage social interaction. Where a better physical framework is created, people can be attracted to stay outdoors and engage in conversations; outdoor activities tend to grow in number, duration and scope (Abu-Ghazzeh, 1999; Farida, 2013). Spooner (2014) suggested that the physical quality of public open space is important for increasing social interaction and proper landscape design can have an effect on the frequency of social interaction and can increase social ties between groups of people (Spooner, 2014). The most known and widely accepted categorization of Gehl (1987) reflects the relationship between the physical quality of space and socialization degree.

Necessary activities are more or less compulsory and include going to school or work, shopping and waiting for a bus. Because the activities in this group are necessary, their incidence is influenced slightly by the physical framework and weather conditions. Optional activities are described as taking place 'if there is a wish and time' and may take the form of walking for fresh air, standing, sitting or sunbathing. Being optional these activities only take place if the weather or place is inviting for any particular individual. These activities are thus very dependent upon the external environment and the quality of that environment. Social activities are all activities that depend on the presence of others in public open space and they considered to be an evolution from necessary and optional activities. Social activities may include children's play, greetings and conversations, communal activities and the passive activities of watching and hearing other people. The design and management of the physical environment can clearly have an impact upon the opportunities that might arise for such social activities (Gehl, 1987). In the context of this study sitting and attendant activities of interest and these activities are generally classified as optional and social activities.

Gehl (1987) suggested that when the activity settings are of poor physical qualities strictly necessary activities occur, when these places are of high quality in addition to necessary activities with long durations then poor quality places a wide range of optional activities will also occur with increasing frequency. Furthermore as levels of optional activity rise, the number of social activities increases substantially (Gehl, 1987). This finding of Gehl (1987) supports the finding of Whyte (1980) that suggest social activities are the indicator of successful spaces. There are some other studies that underlined the relationship between physical quality and social activities. Simões Aelbrecht (2016), who expressed the same ideas with Gehl and Whyte, suggested that promoting togetherness in public spaces by urban design is only possible when more attention is given to the spatial elements that enable it: edges, thresholds, paths, nodes and props. So many types of interactions among strangers occur in public space through these spatial elements (Simões Aelbrecht, 2016). Supporting these ideas, the findings of Abu-Ghazzeh (1999) showed that design of individual spaces and of the details are important in providing the opportunity for various categories of outdoor activities. In the study area he observed that where there was a good quality of outdoor spaces, the optional, largely recreational functions and social activities were developed (Abu-Ghazzeh, 1999). Francis *et al.* (2012) listed the quality features of public open spaces that influence social interaction depending on related literature as including the presence of focal points such as public art, food outlets, connected pathways and seating, nature, attractive buildings and landscapes, and the absence of incivilities, such as graffiti and litter.

Social activities mostly include stationary activities such as sitting, standing, and waiting and people-watching (Simões Aelbrecht, 2016). Depending on his various observations, Gehl (2010) highlighted the importance of stationary activities for their contribution to social life of public open spaces. In a study they determined that staying activities lasted considerably longer and various staying activities accounted for 89% of street life.

Only 11% of life on the streets was due to purposeful movement. These statistics support the connection between lengthy outdoor stays and vitality of public open space (Gehl, 2010) (Figure 1). Similarly in their study Chen *et al*., (2016) determined that sitting and lying activities account for 43.6%, standing accounts for 26.9%, and walking accounts for 29.5% of total activities occurred in study area. Woolley (2003) used the definition passive activities instead of stationary, explained it as including watching-children, vegetation, water, wildlife, activities, and other people- reading, meeting friends or visiting the café, and suggested that these activities are the most frequently undertaken activities in public open spaces which supports Gehl.

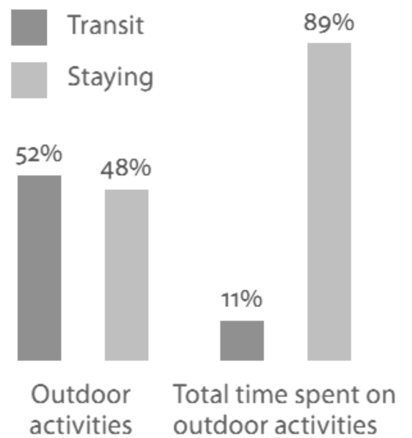

Figure 1: The frequency of transit vs. staying activities and their total time in public open spaces (Gehl, 2010)

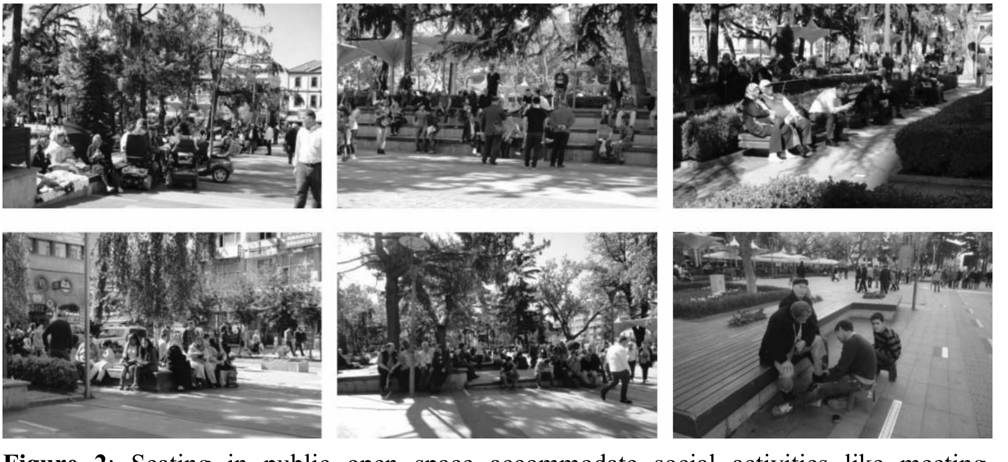

Figure 2: Seating in public open space accommodate social activities like meeting, watching other people and street performances, gathering

According to Woolley (2003) passive activities, some of which are social; being with other people, meeting friends, looking after children, conversing with strangers, and some are solitary; opportunities for contemplation away from the hurly-burly of life or even an anonymous moment, can be linked with the mental health benefits of the restorative opportunities that public open spaces provide (Woolley, 2003). For Gehl (2010) the extent of staying activities can be used as a measuring stick for the quality of public open spaces and are the key to a lively city, but also the key to a truly delightful city. People stay in a place if it is a beautiful, meaningful and pleasant place to be. He stated that a good city and a good party are similar: the guests stay on because they are enjoying themselves (Gehl, 2010).

Mehta (2007) emphasized the importance of social opportunities which are provided through the presence of people in public open space. A lively street is defined as a street with the presence of a number of people engaged in a variety of predominantly stationary and sustained activities, particularly those activities that are social in nature. These postures and activities include standing, sitting, lying, talking, eating and drinking, reading, using a laptop, window-shopping, smoking, vending, playing a game or musical instrument, listening to musicians, and so on. This means stationary and sustainable activities such as sitting, standing; leaning supports successfully other activities that bring out socialization Mehta (2007). Whyte (1980) as mentioned before accepted the level of socialization in public open spaces as an indicator of their success and tried to define the factors that are effective on the level of open space use by dealing diverse variable. Sun, aesthetics, shape, the amount of space, cleanness, elegance were the factors but none of them showed a clear relevance with the level of use. It was determined that the most popular plazas tend to have considerably more sitting space than the less well-used ones. Whyte (1980) concluded that people tend to sit most where there are places to sit. However, sitting space is only one of the many variables and cannot explain the cause effect relationship alone. But sitting space is most certainly prerequisite. The most attractive fountains, the most striking designs, cannot induce people to come and sit if there is no place to sit. Gehl (1987) supports the findings of Whyte (1980) as; only opportunities for sitting exist can there be stays of any duration. If these opportunities are few or bad, people just walk on by which means not only that stays in public are brief but also that many attractive and worthwhile outdoor activities are precluded. He defined the number of opportunities for seating, including seating in sun or shade, with options for shelter from the wind, and flexible seating such as offered by outdoor cafes, as well as the informal affordances mentioned earlier steps, ledges, bollards, etc. that offer a place to rest as a key attribute for better and more sociable use of public open spaces (Gehl, 1987) (Figure 2). While those seated are evidently not engaged in physical activity, they provide a social ambience and informal surveillance for those passing by, and seats and cafes offer attractive destinations or rest stops for walkers (Ward Thompson, 2013).The study conducted by Zacharias et al.(2004) at San Francisco's plazas supports the finding about the importance of sitting space. In light of the idea that social interaction is a public good Burns (1997) examined the occurrence of stationary activities such as sitting and standing and attendant activities in terms of their contribution to social interaction. It was determined that in the study area different spaces were preferred based on specific needs and the activities that occurred in these include stationary activities, especially sitting and attendant activities (Fig. 3) (Burns, 1997).

There are other researches, findings of which emphasize the importance of sitting behavior or seating areas. Studies about neihgbourhood open spaces showed that residents needed appropriate outdoor places to sit and socialize with their neighbours and friends, and to watch their children at play (Abu-Ghazzeh, 1996) or they were frustrated by the absence of places to sit down (Cattell et al., 2008). Another study revealed that the availability of seating is a contributing factor for successful social and restorative spaces (Spooner, 2014). In the same study respondents indicated that the lack of available seating is a significant deterrent and limiting factor, also the correlation between seating and social spaces discovered (Spooner, 2014). Mehta (2014) identified sitting space as a physical character that can contribute to comfort in public open spaces and as an important attribute of good public space that makes it convivial.

Figure 3: Varying sitting and attendant activities observed in a public open space (Burns, 1997)

A study on the effects of improvements in bench seating in Oslo, applied by Gehl Architects, showed that simple changes can significantly change the patterns of use (Gehl & Svarre 2013). In 1998 the old benches were replaced by new ones that more than doubled the area's seating capacity (+129%). Surveys in 1998 and 2000 before and after the change show that the number of people who sit in the area has correspondingly doubled in response to the new options (+122). To put simply, the conclusion was that doubling the amount of bench seating meant a doubling of the number of people seated (Gehl & Svarre 2013). Simões Aelbrecht (2016) determined that seating edges provides passive and active social encounters with activities such as sitting and people watching. Hadavi *et al*. (2015) found out that people preferred photographs of public open spaces with seating facilities and in their classification of photographs social activities and seating areas groups were overlapped; selected seating areas promoted socializing as opposed to isolated opportunities for sitting. Chen *et al*. (2016) observed in their study that sitting activities account for 15.0% of all activities in the area. Regular and auxiliary seats support 51.6% of stay activities, indicating that such facilities can encourage visitors to stay in a specific area (Chen *et al*., 2016).

3. Design of Seating Areas and Furniture

The literature review in previous section revealed the importance of seating areas in terms of social life and vitality of public open spaces. Depending on this importance some studies tried to define various features of seating areas and furniture. However studies focusing on the design of sitting spaces and investigate the issue deeply and from various perspectives are deficient. Under this section the issues and criteria about seating design are presented in a wide extend. About urban furniture which includes a wide range of seating types Siu & Wong (2015) suggested that the design, installation and maintenance are important factors, as people tend to interact with these public facilities in their daily lives well-planned and designed street furniture can provide important services and essential utilities that help to maintain and develop the social life (Siu & Wong, 2015). Therefore detailed information on seating areas has potential value for its practical benefits for environmental designers. Based upon a city quality study a four point scale was developed to assess seating quality (Gehl, 2010) which are pleasant microclimate, good placement preferably at the edge of the space with your back covered, a good view, an appropriately low noise level to allow conversation, and no pollution. In our study the groups consist of behavioral/functional factors, comfort factors and perceptual/psychological factors. However, it is impossible to draw clear distinctions between these groups since some factors can be placed in more than one group, and therefore groups can be overlapped more or less.

3.1. Behavioral/Functional Factors

Under this section the shape of seating and variations in sitting behavior, and user differences will be discussed.

Seating shape and variation in sitting behavior: Gehl (2010) stated it is important to create seating with different opportunities for being alone on the one end of scale and for social groups on the other end. Varying seating supporting socialization between these two ends invites various users. For users who want to maintain a distance to others long even benches are appropriate (Gehl, 2010). Cooper Marcus and Francis (1998) suggested two types of seating for those who come alone and want to sit near but not within eye contact of other users. Straight seating like steps, ledges, or straight benches permit natural spacing between people and do not force unwanted eye contact, as would benches set at right angles or opposite each other. Another option is a circular bench round a planter (for trees or flowers) which enables several unattached users to sit fairly close but to maintain their privacy by looking out in different directions (Cooper Marcus & Francis, 1998).While city benches are good for preserving private space and distance, they are not very good at supporting communication. For two people it is possible to turn head and get a conversation going, but if a group is seated, a row of benches is not inviting (Gehl, 2010). Gehl (2010) suggested grouping of benches into a “talkscape”, which is a term used by architect Ralph Erskine who in his projects set two benches at an angle with a small table facing them so people could talk as well as use the table. The benches were set up at a slightly open angle so that people could choose to be together or alone, which allows for the option of conversation (Gehl, 2010). Similarly Crankshaw (2009) suggested clustering sitting furniture in ways that allow people to look at one another comfortably, encouraging conversation. Hadavi *et al*. (2015) have found out in their study that benches that are designed and arranged to encourage socializing are most preferred. Cooper Marcus and Francis (1998) offered wide backless benches, benches forming right angles at corners, and benches curving inward to accommodate groups of three or more. Movable chairs and tables might also be provided (Cooper Marcus & Francis, 1998). Huang (2006) determined that in a public space which includes both concave seating and convex seating the percentage of social interaction is greater at concave seating than at convex seating. Concave seating allows facial contact and encourages interaction. Convex seating makes facial contacts difficult and discourages socializing (Huang, 2006).

User differences: Different users have different needs and features. The success of seating areas at responding this variety is of importance for public space to be inviting for all users. Especially older people and design of seating is commonly discussed. Yung et al. (2016) emphasized the physical and psychological health benefits of the social interaction for the older people. They listed design criteria of public open space for the older people as; outdoor seating/urban furniture/spatial setting; seating area for rest, communal spaces, special seating, and talking spaces (Yung et al., 2016). Ward Thompson (2013) suggested that environments that offer frequent opportunities for sitting, perching or leaning against some kind of support become very important for older people since they have lower levels of stamina. Lack of these kinds of affordances may mean that older people decide not to go out at all, or limit their outdoor activity (Ward Thompson, 2013). Gehl (2010) mentioned that adults and seniors want more comfort and are careful about choosing where to sit. Comfortable city furniture, preferably with back and arm rests as well as good sitting comfort on seating-friendly materials, is often decisive for whether these groups want to sit down in urban space and stay a while (Gehl, 2010). In their study which aimed to design a bench based on the needs and features of older Swart *et al*. (2009), similar to Gehl (2010) suggested that bench should be comfortable and encourage good sitting posture; the furniture must have a backrest for comfort and a feeling of safety. They defined the height, width and depth of bench based on anthropomorphic features of older and Dutch people (Swart *et al*., 2009).

According to Gehl (2010) children and young people can sit anywhere and on anything. Comfort, climate and materials do not play a significant role (Gehl, 2010). For young people, edge spaces are often the best spaces to test their social identity because engagement with strangers becomes less risky. This is particularly true of seating edges, benches and arcades, which strike a good balance between exposure and comfort (Simões Aelbrecht, 2016).

3.2. Comfort Factors

Mehta (2014) stated that the feeling of comfort in a public open space is affected by numerous factors such as perceived levels of safety, familiarity of the setting and people, weather, physical conditions, convenience and so on. Spooner (2014) has determined adequate seating, appropriate noise levels, a comfortable microclimate, and visual access to vegetation as comfort factors. Under this section climatic/ environmental comfort, social comfort, and material and amount of seating will be discussed. Psychological comfort is also determined as a dimension of comfort by the authors, however, it is also an important component of perceptual/psychological factors, and therefore it will be discussed under that section.

Climatic comfort/environmental comfort: Environmental conditions imposed on people using open spaces, may improve or ruin their experience of them. Integrating environmental objectives to public open space design will increase the use of outdoor (Nikolopouloua & Lykoudis, 2007). Work with climate and climate protection concentrates on three levels of climate: macro-, local and micro-. Macroclimate is general regional climate. Local climate is the climate in cities and built environments, moderated by the topography, landscape and buildings. Microclimate is the climate in a local atmospheric zone. It can be as small as a single street, in nooks and crannies and around a bench in city space (Gehl, 2010). Climatic conditions especially on micro level including temperature, sunlight (expose and/or shield users from the sun) and shade, wind, and humidity influence the feeling of comfort and are important in supporting outdoor activities in public spaces (Gehl, 2010; Mehta, 2014).

Existing research shows that sunlight is a major attraction in the use of public open spaces (Whyte, 1980; Mehta, 2014; Tsitoura *et al*., 2014). However, several studies concluded that while sunlight is an important factor in the spring, people seek shade during the warmer summer months. Therefore sun control is an important factor which influences the comfort vote and is decisive for the viability of the outdoor space (Whyte, 1980; Mehta 2007, Tsitoura *et al*., 2014). Whyte (1980) emphasized the importance of choice-of sun, or shade, or in-between for a good experience of public open space.

Temperature is another factor which changes the comfort effect of sunlight from pleasant in spring days to disturbing in summer days. Literature research showed that comfortable temperature is needed if people are to linger in a public space (Nikolopouloua & Lykoudis, 2007; Crankshaw, 2009; Spooner, 2014; Tsitoura *et al*., 2014). Achieving thermal comfort varies by region and climate. Depending on the climate, a mix of sunny and shaded areas, shelter from excessive wind, or exposure to light cooling breezes may be required (Crankshaw, 2009). In a study the spatial distribution of the interviewees demonstrated that in summer, visitors prefer to sit in shaded areas, whereas in autumn and winter sunlit areas are more popular (Nikolopouloua & Lykoudis, 2007). Findings of Niu *et al*. (2015) revealed that shading level affected the number of visitors, because of better thermal comfort.

Many researches addressed the importance of climatic factors in design of public open spaces. Mehta (2014) accepted that good microclimatic conditions that may largely be a consequence of man-made conditions altering the natural climate is a prerequisite for supporting outdoor activities in public spaces. Incorporating design features that make outdoor spaces comfortable and encourage their use under a broad range of environmental conditions is suggested (Figure 4).

Figure 4: Providing sunlight, shade and in-between choices help people for their thermal comfort and shadows of trees create interesting textures which enhances the pleasantness of the place

Creating variety of conditions that expose and/or shield users from the sun, shade, and wind; features such as windbreaks, awnings, vegetation, green walls, and other barriers to mitigate harsh microclimatic conditions that arise from sun and wind exposure is suggested (Spooner, 2014). According to Gehl (2010) it is always possible to improve microclimate, particularly around the places that want to invite people to stay, where microclimate requirements are particularly stringent. Landscaping, hedges and fences can provide shelter exactly where most needed (Gehl, 2010). Also placing enough seating facilities under tree crowns and building shadows must be considered (Chen *et al*., 2016).

Other environmental factors are noise and pollution levels. Acceptable noise levels (defined by the U.S. Environmental Protection Agency) are a maximum of 55 decibels (Spooner, 2014). While locating seating in a public space areas close to heavy traffic must be avoided in order to block the negative effects of pollution and noise.

Figure 5: Social comfort; variety in seating of a public space is important for increasing choice for different needs and requests of users

Social comfort: Social comfort was asserted by Whyte (1980) which means choice: sitting up front, in back, to the side, in the sun, in the shade, in groups, off alone. In addition to physical comfort social comfort is also important. Whyte (1980) suggested that choice should be built into the basic design and the best course is to maximize the sittability of inherent features. This means making ledges so they are sittable, or making other flat surfaces do double duty as table tops or seats. Different people want to sit in different ways and, given enough choice, each will seek out the setting best suited to him or her. Thus, to serve a variety of users, every outdoor space should provide a variety of seating, not only in location but also in differing forms of seating posture (Fig. 5). Seating should reflect this variety and uniform seating must be avoided since this fact is ignored and they force people to conform to one type of bench or chair, limiting the possibility of personal choice (Cooper Marcus & Francis, 1998; Spooner, 2014). Offering a wide variety of seating options by providing selection seating furniture may attract more people to the outdoor space and allow them to use it in multiple ways (Spooner, 2014). Gehl (2010) paid attention to this fact too; he suggested that in addition to comfortable, well-situated primary seating, many secondary seating options are often needed, places where people can more informally and spontaneously sit to rest or look around. A great variety of objects can be used to sit on: pedestals, steps, stones, bollards, monuments, fountains or the city floor itself. On days when seating is in high demand, secondary seating can make a valuable contribution to the city's total seating selection. Secondary seating options have the advantage of being steps, flower pots pedestals and so on every day of the year but can be used as seating when necessary (Gehl, 2010).

A sufficient and varied selection of seating in the city can be established with a combination of primary and secondary seating. Primary seating consists of actual furniture with backs and arms: city benches, freestanding chairs and café chairs. In all cases the backs and arms of the seating will only contribute to comfort if people want to stay for a while or for the senior citizens who need support while seated and when sitting and getting up again (Gehl, 2010). A plaza that offers a plenty of places to sit that are not all benches does not appear so empty when people are not present. So-called secondary seating-mounds of grass, steps with a view, seating walls, and retaining walls that allow seating-can appear as part of the sculptural effect of the design and need not look lonely when devoid of people (Cooper Marcus & Francis, 1998).

Material and amount of seating: The seating material also impacts on comfort (Gehl, 2010). Cooper Marcus and Francis (1998) defined wood as a warm and comfortable material for public seating; other materials are much colder and harder but could be effective for secondary seating. Such materials include concrete, metal, tile, and stone. Hadavi *et al*. (2015) determined that wooden benches seem to be preferred over metal and concrete benches with solid forms. It was suggested that materials such a rough unfinished wood or concrete aggregates should also be avoided if they even look as though they might damage clothes (Cooper Marcus & Francis, 1998). Another fact about the material is being appropriate to weather conditions. Especially water repellant or fast drying materials will be more suitable for cities which have typically rainy seasons.

The optimal amount of seating that a public open space needs in order to be successful is examined by different studies. Whyte (1980) suggested a ratio of one square foot of seating for every thirty square feet of outdoor plaza space. Another suggestion is based on user number; seating needs to be available to handle five percent of total site users (Spooner, 2014).

3.3. Perceptual/ Psychological Factors

Under this section factors related to perceptual features of environment is considered and psychological security, orientation and aesthetics, and unity and identity will be discussed.

Psychological security: Psychological security is related to having control over the environment, maintaining privacy and avoiding being socially or physically lost (Jalaladdini & Oktay, 2012). Spatial behavior of human is greatly affected by the feeling of safety. Prospect-refuge was defined as affordances for seating areas in order to get the feeling of safety (Mumcu, 2009; Mumcu et al., 2010). Appleton (1975, 1988) stated that evolutionary development of humanity has led humans to prefer a setting in which, without being seen (refuge), they can see a broad vista (prospect). These landscape features seem to simplify survival, also satisfy aesthetic pleasure. An unimpeded opportunity to see is called a prospect whereas an opportunity to hide is called refuge hence the name prospect refuge theory emerges when these two words combine (Appleton, 1975). In a study aimed to determine a relationship between this theory and sitting behavior it was found out that prospect and refuge affects the choice of seating (Mumcu, 2009). Similar affordances of the environment for seating are defined as edge effect by Gehl (1987, 2010). Places for sitting along facades and spatial boundaries are preferred to sitting areas in the middle of a space; people tend to seek support from the details of the physical environment. Sitting places in niches or at other well-defined spots and sitting places where one's back is protected are preferred to less precisely defined ones (Gehl, 1987). Users' backs are protected, and frontal sensory apparatus of users can comfortably master the situation. A full view of everything going on in the space is provided and users are in no danger of unpleasant surprises from behind. Furthermore the local climate is best there (Gehl, 2010). There are existing researches supporting these explanations. Chang (2002) determined that the most frequently used sitting places are the ones on the edge. Lyle (1970) found out that people in open spaces showed tendency for clustering at the borders of the space.

Orientation and aesthetics: Cooper Marcus and Francis (1998) stated the importance of variety of orientations which includes variety in what is seen while seated, for people differ in their needs to watch passersby, water, foliage, distant views, nearby programs, and the like; and also variety in sun and shade, as not only do people want more or less according to their own circumstances (Figure 6). People are attracted to other people (Abu-Ghazzeh, 1999, Spooner, 2014). Therefore the view of city life and people has special status as main attraction and people will be drawn to a location where other people are passing by (Cooper Marcus & Francis, 1998; Gehl, 2010). Orienting seating to view where highest concentrations of people are likely to be provides an important affordance for users. Lyle (1970) determined that people choose to be where there are people. Places far away from main circulation and isolated ones were less used compared to others. Many people preferred to turn their faces to open areas where people engage in activities or statues, water features are present. Similarly Mumcu (2002) found out that seating with wide view and looking at the street where the human activity takes place were occupied for longer times than the others.

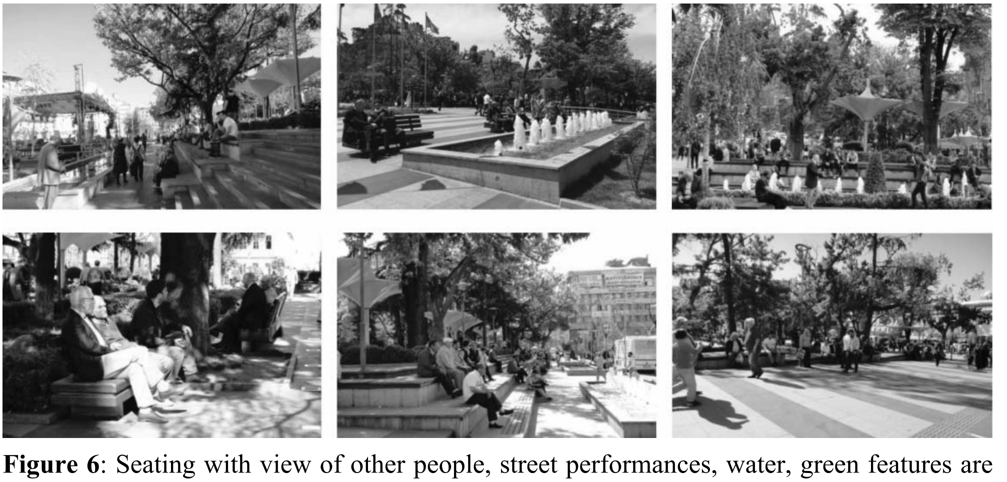

Figure 6: Seating with view of other people, street performances, water, green features are preferred physical features of public open space

The existence of interesting objects or features, such as artificial water scenery also encourages the use of public space (Farida, 2013). Water is an important element in landscape design, existence of which considerably increases the environmental preferences of people. But the element of water should harmonize with the physical features of the space and the activities taking place in the surrounding environment. It should also meet the physical and psychological needs of people associated with their activities (Düzenli et al., 2014). The look, feel and sound of water features like waterfalls, water walls, rapids, sluiceways, tranquil pools, water tunnels, meandering brooks, and fountains were defined as important attractions (Whyte, 1980). Spaces featuring water elements can answer the psychological needs of people (such as relaxing, reducing stress, harmonizing with the nature, socializing, and having fun) living in cities and feeling tired of the sometimes hectic rhythm of everyday work life (Huang, 1998). Gedik (2003) found out that users associate passive activities of watching, sitting, talking, and relaxing with waterscapes with still water elements, as well as with water is in a very slight motion. To sum up, the view of other attractions such as water, trees, flowers, fountains and architecture should also be part of public open space design. The view is even better if several attractions can be combined. Gehl (2010) suggested that careful thinking about views and options for looking must be part of the effort made for good city quality (Gehl, 2010).

Figure 7: Tree crowns and other green elements enhance the outdoor experience of people

Unity and identity: Designing seating must be a part of public open space design. But generally seating is thought as something can be choose from a furniture catalogue and added later. However, street furniture, whether historical or contemporary, is widely recognized as making an important contribution to the local identity and character of the urban landscape and the existing sense of place (Siu & Wong, 2015). When all elements are merged into a convincing architectural whole; proportions, materials, colors and details reinforce and enrich the other qualities of the space (Gehl, 2010). Therefore seating must be integrated into design of space and display a unity with forms, color, proportion, direction and texture of space. Unfortunately, the overly standardized street furniture tends to create a sense of sprawl with no identity and produces visual monotony (Siu & Wong, 2015). When design of seating dealt separately from the space and unity in design elements cannot be provided generally arrangements floating freely in public open spaces are the result. This reflects random planning and disregards elementary psychological considerations. Also randomly combined details, materials and colors rob public space of visual coordination (Gehl, 2010).

CONCLUSION

Public open spaces are substantial components of a city; the contributions of social life taking place at here support city life and citizens, thus directly affects the quality of life. It was suggested that public open spaces have multifaceted and essential social benefits such as enhancing the sense of community, encouraging sociability, contributing to identity development, being a stage for democratic expressions, providing continuity from past to present. Therefore the reasons for public open spaces to be successful were frequently considered, and why some of them were jammed and some others were vacant was analyzed. Existing researches showed that stationary activities like standing, sitting, leaning, and relaxing paves the way for social activities; the existence of stationary activities creates highly use and vitality in a public open space. The spaces without physical qualities that accommodate stationary activities are bound to be vacant and inanimate. Especially sitting and attendant activities are important for the success of public open spaces. Because only where opportunities for sitting exit there can be stays of any duration and engaging other activities. Researches revealed that the highly used open spaces are the ones with more sittable places; people sit where there are places to sit, thus in these places more optional and social activities occur and this creates vitality. How sitting spaces which has such substantial role in the occurrence of social life must be designed? Various studies focused on various features of public spaces, however, studies which considered this issue deeply and in a wide context is deficient. In this study subjects about the design of seating areas in public open spaces were considered in detail, discussed from different point of views and exampled with existing literature. Various design issues under the groups of behavioral/functional, comfort, and perceptual/psychological factors were examined. As a result it was determined that in the design process of seating furniture that aimed to encourage sociability various factor must be taken into account and evaluated. Seating that respond to different needs and requests of different users; should provide variety in between being alone and social, must provide climatic, social, and material comfort, support psychological security and aesthetic needs, provide affordances for watching people and city life and contact with natural elements, create unity with the space in which they are located in terms of design elements such as form, texture, color, proportion etc. and contribute to formation of identity. Seating furniture which responds to these criteria promotes the physical quality of the public open space that it belongs to and thus contributes to city life positively by developing sociability.

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Chapter 11

Landscape Design Approaches Based on Fractal Geometry

Filiz ÇELİK*

1. INTRODUCTION

Fractal geometry is one of the widest reaching mathematical developments of the 20^{th} century. Fractal geometry is not only new branch of mathematics but also is a new approach of art and design.

Fractals are found in nature, in geometry and in algebra. What makes fractals even more interesting is that they are the best existing mathematical descriptions of many natural forms. Fractals are able to see in every aspect of our lives; in the clouds, the mountains, the rivers, the snow-flakes, the shells, parts of living organisms and in every tissue of the human body, etc. Fractals are not limited to geometric patterns, but can also describe events and processes in time such as lightning bolts, hurricanes, patterns of magma-transport processes in time, the ripples on the ocean, wave patterns, etc.

The idea of landscape design in harmony with nature can be traced back to ancient times. As the language of nature, it is natural to assume that fractal geometry could play a role in developing new forms of landscape design.

The purpose of this study is to explain the notion of fractal geometry for generative landscape design studies. Initially this paper gives a brief description of fractal geometry theory and recent developments through illustrative review of some fractal case studies in art, design and landscape design. Then how the fractals create and explain the most important fractal properties, and which make fractals useful for landscape designs are explained.

2. FRACTAL GEOMETRY

Fractal geometry as such dates from 1975; many of its tools and concepts had been previously developed, for diverse purposes altogether different from Benoit B. Mandelbrot (Mandelbrot, 1983). The mathematical history of fractals began with mathematician Karl Weierstrass in 1872 who introduced a Weierstrass function which is continuous everywhere but differentiable nowhere. In 1904 Helge von Koch refined the definition of the Weierstrass function and gave a more geometric definition of a similar function, which is now called the Koch snowflake (Fig. 1). In 1915, Waclaw Sierpinski constructed self-similar patterns and the functions that generate them. Georg Cantor also gave an example of a self-similar fractal. In the late 19^{th} and early 20^{th}, fractals were put further by Henri Poincare, Felix Klein, Pierre Fatou and Gaston Julia (Lu et al., 2012).

The term "fractal" was first used and introduced by mathematician Benoit B. Mandelbrot in 1975. The term of fractal has been derived from the Latin fractus meaning "broken" or "fractured". Fractal is the common name often complex geometric

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shapes showing the self-similarity property in mathematics. A fractal is irregularly shaped and it cannot be described by using the traditional aspects of Euclidean geometry (Pant and Pant, 2013). Nevertheless, in nature and in mathematics, there exists another concept of geometry that is known as fractal geometry (Rian and Sassone, 2014). A fractal is mathematically described as a set whose every point is contained in a scaled down copy of the set (Pant and Pant, 2013).

A fractal is a quantity or objects which exhibit self-similarity on all scales. Even at arbitrarily small scales, it has fine structures. Fractals are self-similar, meaning thereby that a fractal is exactly or approximately similar to a part of itself. Self-similarity means that each small portion, when magnified, can reproduce exactly a larger portion. Mathematically, a fractal is based on some equation which undergoes iteration (Fig. 1) (Pant and Pant, 2013).

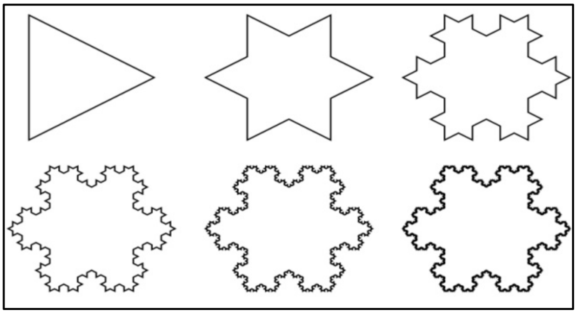


Figure 1: Koch snowflake

Soon after its early development in the beginning of 1980s, fractal geometry has been applied to understanding and modeling the nonlinear and complex shapes in a list of different disciplines, ranging from science to engineering and medicine to arts (Rian and Sassone, 2014).

2.1. Type of Fractal Geometry

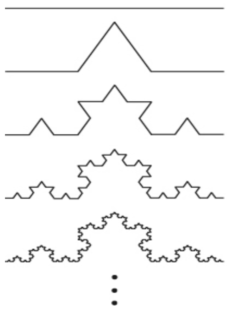
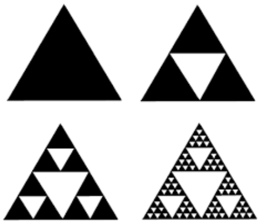
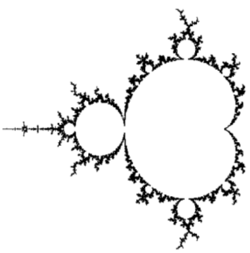
It is possible to characterize fractals into different 'types' such as self-similar fractals and self-repeating fractals.

In representative type of fractal geometry, there are Cantor dust, Koch curve, Sierpinski gasket, and Mandelbrot set. Summarizing those shapes and creation process, it is as shown in Table 1 (Lee, 2014).

2.2. How to Make a Fractal Shape?

A fractal is a never-ending pattern. Fractals are infinitely complex patterns that are self-similar across different scales. They are created by repeating a simple process over and over in an ongoing feedback loop. Driven by recursion, fractals are images of dynamic systems-the pictures of Chaos. Geometrically, they exist in between our familiar dimensions. Fractal patterns are extremely familiar, since nature is full of fractals. In normal geometry shapes are defined by a set of rules and definitions. For instance a triangle consists of three straight lines that are connected. The rules are that if you have the length of all three sides of the triangle it is completely defined; also if you have the length of one side and two corresponding angles the triangle is also defined. Though the rules defining a triangle are simple, huge amounts of useful maths have come out of it.

Table 1: Type of fractal geometry

Type:	Form:	Morphosis:
Cantor dust (1872)		Infinity repeat of process that removes middle 1/3 portion and leave both 0~1/3, 2/3 ~1 portion in 1 length line
Koch curve (1904)		Trisect line segment bends and raises line segment of middle, and creates line segment four that is 1/3 length of original line segment. Infinity repeat of process that change with four line segments that occurred newly reducing constructor.
Sierpinski gasket (1916)		Infinity repeat of process that remove middle triangle among four triangle that created by connecting emphasis of each jargon of regular triangle.
Mandelbrot set (1975)		A set of complex number c that do not diffuse $z=z^2+c$ in case calculated repeating when z early value by $z=0+0i$ in complex number formula. $z=z^2+c(z=x+yi, c=c1+ c2i)$

Fractal geometry also defines shapes by rules; however these rules are different to the ones in classical geometry. In fractal geometry a shape is made in two steps: first by making a rule about how to change a certain (usually classically geometric) shape.

This rule is then applied to the shape again and again, until infinity. In maths when you change something it is usually called a function, so what happens is that a function is applied to a shape recursively, like the diagram Fig. 2. After it has repeated an infinite amount of times, the fractal shape is produced. The best and the simplest fractal shapes are the Koch curve and the Sierpinski gasket (Fig. 3).

2.3. The Fractal Geometry of Nature

The fractal geometry of nature was first set forth by Benoit B. Mandelbrot. This geometry combines the mathematics and the science necessary to tackle a certain broad and widespread class of natural shapes (Mandelbrot, 1983). Fractal geometry can explain and model many of the complex shapes and networks in nature that were uneasy to explain and reproduce by other regular and conventional geometric systems (Rian and Sassone, 2014).

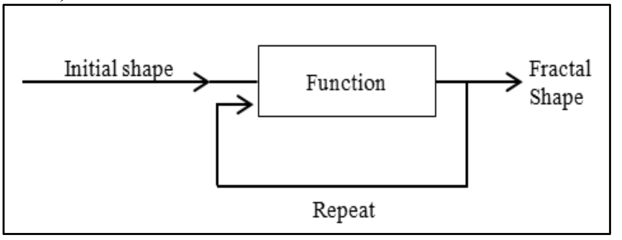


Figure 2: Making a fractal

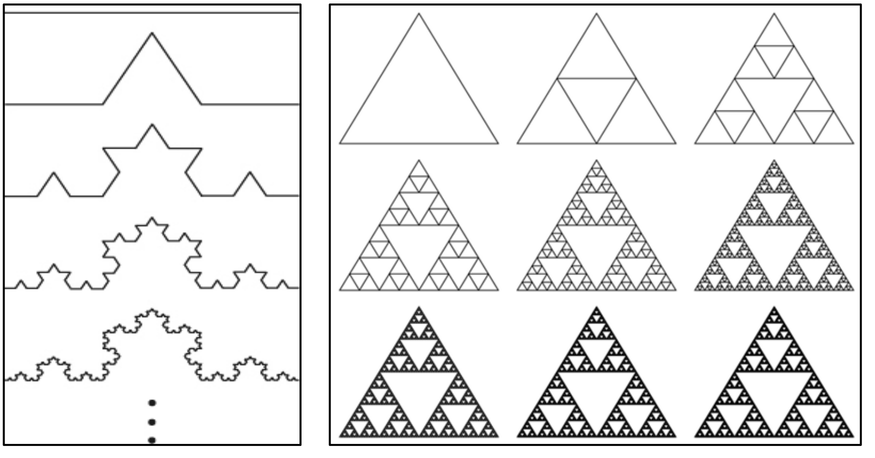


Figure 3: Koch curve and the Sierpinski gasket

Fractals are not limited to geometric patterns, but can also describe processes in time. Fractals are dynamic objects, where their geometry depends on an evolutionary process (Triantakonstantis, 2012). Examples of fractals among natural shapes, processes and rhythms:

- The human body (in every tissue of the human body, inner surface of the lung, blood vessels, nerve impulses),
- Nano-sized particles of metals,
- The shape of the earth (landscapes, mountain ranges and ridges, river networks, fjords, shorelines and coastlines) (Fig. 4),
- Some natural events and processes (lightning bolts, hurricanes, patterns of magma-transport processes in time, the ripples on the ocean, wave patterns, flood levels of rivers, vortices in a turbulent fluid, soil fracture pattern, snow-flakes, water crystals, ice crystals, natural rough lines of clouds) (Fig. 5),
- Some animals (shells, nautilus shell, starfish, peacocks) and animal coloration patterns, parts of living organisms (Fig. 6),
- Plants (tree branches, roots and barks, leafs, flowers, some fruits, various

vegetables) (Fig. 7) and (Fig. 8) (Mandelbrot, 1983), (Shaw, 1987), (Bovill, 1996), (Stewart, 2010), (Pant and Pant, 2013).

Hierarchy is often found in nature and reflects the presence of fractal geometry in natural structures. This helps us to understand the relationships among the functional and ecological patterns. A stream pattern may show a clear ordering of importance from the small streams emerging from springs through increasingly larger ones resulting from the confluence of the smaller until a large river results (Fig. 4) (Bell, 2004).

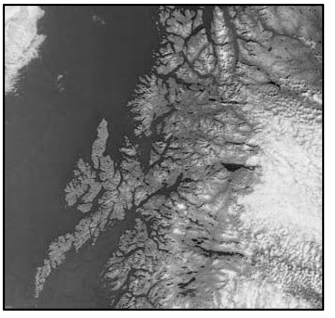



Figure 4: Mountain ranges, river and fjords

In many natural patterns the repetition of a particular shape at a range of sizes and scales, according to fractal geometry, represents an aspect of continuity which can be seen from a range of observer positions (Fig. 5) (Bell, 2004).

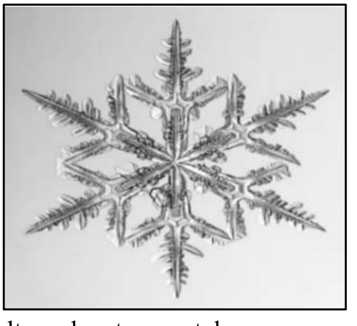



Figure 5: Lightning bolts and water crystal

The nautilus is one of the most famous examples of a fractal in nature (Fig. 6). The perfect pattern is called a Fibonacci spiral.

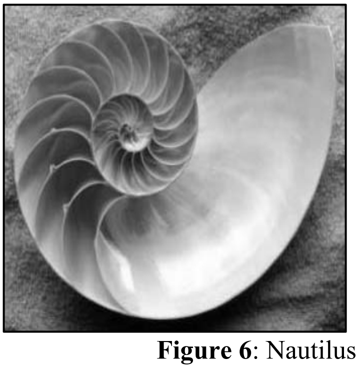
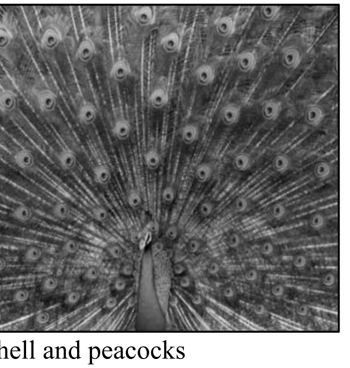



Figure 6: Nautilus shell and peacocks

Self-similarity at a range of scales is a key feature of fractal geometry and thus of many aspects of the natural world (Bell, 2004). Self-similarity relates plant structures to the geometry of fractals (Fig. 7) (Prusinkiewicz and Lindenmayer, 1996).

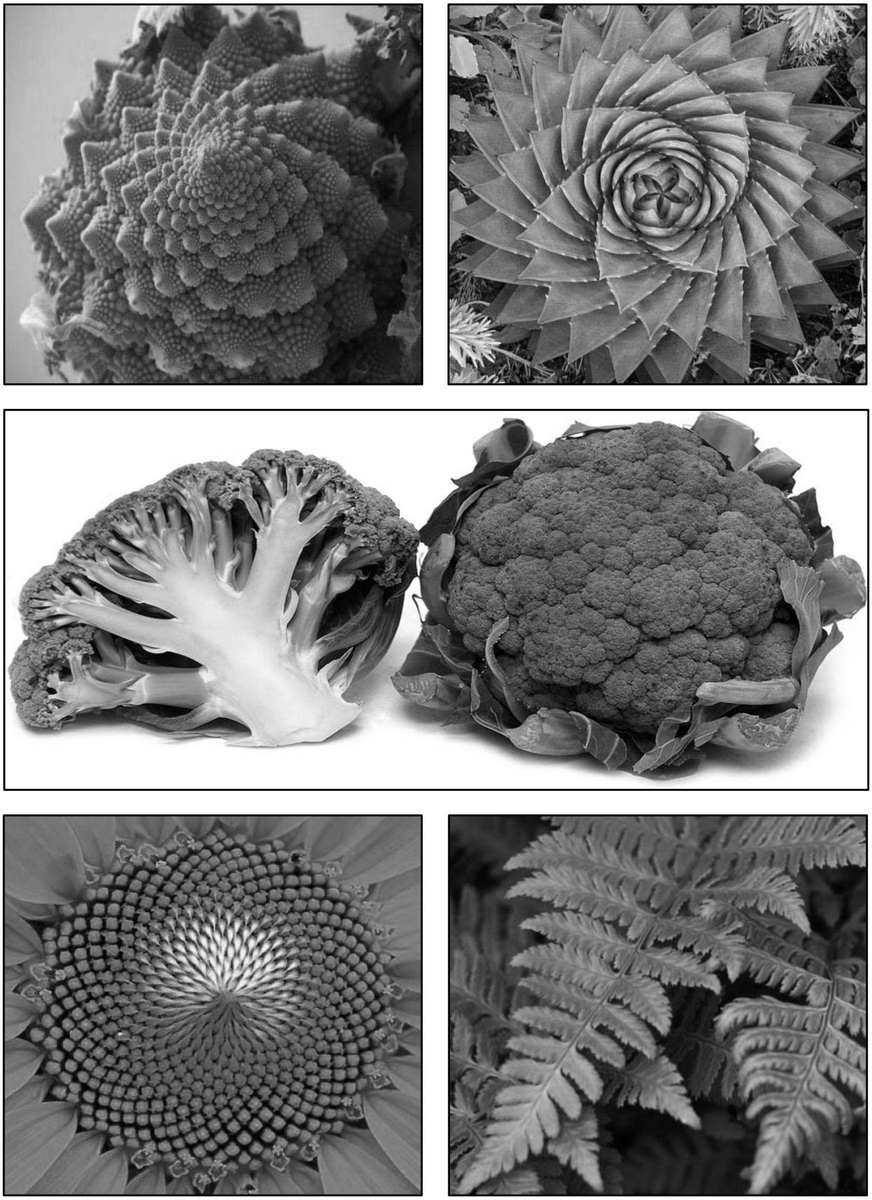


Figure 7: Romanesco broccoli, Aloe sp., cauliflower, sunflower and fern

Truly fractal patterns have the property of self-similarity at a range of scales, so that on ever-closer examination the same pattern is revealed time after time (Fig. 8) (Bell, 2004).

Figure 8: Tree branches and bark

3. INSPIRATION FROM NATURE IN DESIGN

Nature has been always a source of inspiration for the human in design. Natural forms, as inspiration for design, are evident in art, architecture and landscape architecture throughout history. However, until recently, it was not understood that many natural forms and processes possess a common ordering characteristic-a characteristic described by the mathematics of fractal geometry (Perry et al., 2008).

Taking inspiration from nature to solve human problems is the idea behind biomimicry or biomimetics. Janine B. Benyus says that engineers, scientists, architects and designers are often humbled, and then excited, when they discover how nature already has solutions to their challenges, and how it generally outperforms their traditional solutions, showing them creative alternatives (Benyus, 2002).

In terms of landscape design, the powerful influence of Ian McHarg's seminal work "Design with Nature" still resonates within landscape design today. Similarly, over the last years, an awareness of the importance of nature to ecologically sustainable designed landscapes has been growing. In landscape design works the ones which have been designed so close to nature, still there are some parts in one of their forms, function, or structure from nature. Because fractal geometry is the basis for many of the forms and the patterns found in nature, the philosophy of inspiration from nature about forms and patterns based on fractal geometry.

Around the same period, discourse within the art and design professionals (Fig. 9 and Fig. 10) on the aesthetics of nature, ecology and the environment began to grow, from concept of the inspired nature to idea of using nature's geometry (Perry et al., 2008).

3.1. Fractal Geometry and its Applications in the Field of Art and Design

Fractals are the ultimate inspiration for artists and designers. Today, many scientists are trying to find applications for fractal geometry. Fractal geometry is specifically used as theoretical as well as technical tools for the analysis, interpretation and description of complex, natural and human phenomena, where continuous or Euclidean geometry are failed to describe. Fractals are used as a helping tool for explanation in many fields ranging from medicine to economy. Natural shapes and rhythms, such as leaves, tree branching, mountain ridges, flood levels of a river, wave patterns, and nerve impulses, display this cascading behavior. These fractal concepts are found in many fields, from physics to musical composition (Bovill, 1996). Because of its geometric nature, the idea gained its popularity with mathematicians, artists and designers (Kobayashi and Battina, 2005).

Figure 9: Nature inspired fashion design

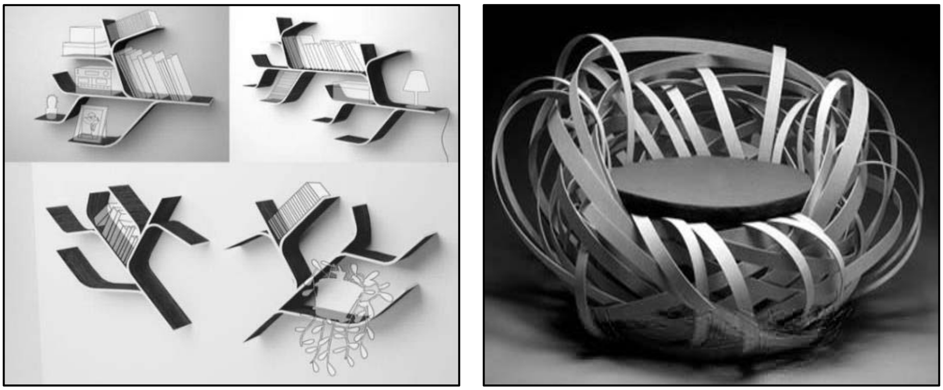


Figure 10: Nature inspired bookshelf and armchair

In the field of built environment, applications of fractal geometry include architecture, urban planning, landscape design, and so on (Rian and Sassone, 2014). Recently, thanks to the development of advanced computers, the domain of fractal geometry applications has covered a wide set of scientific discipline, ranging from mathematics (Berkowitz, 1998), natural sciences, pure and applied sciences, biology and medicine, to engineering, art, landscape architecture (Perry et al., 2008) and architecture (Bovill, 1996).

It is because fractal has inherent principles and attributes useful in application into art and design (Lee, 2014). The concept of fractal has been applied and examined in the creation of fine art and other field in which relevant geometry is relevant (Dinep and Schwap, 2010). Fractal geometry has been growing up in the field of art and design. There has been significant interest in the application of fractal geometry as a tool for form creation in the fields of art and design (Table 2).

Fractal patterning and self-similar repeated forms, at different scales, have been discovered within various artistic compositional techniques (Perry, 2012). Broadly speaking, there are two ways that fractal concepts can be used in art (Fig.11), architecture (Fig.12) and design. First, the fractal dimension can be measured and used as an analytical tool for design. Second, fractal organization principles can be used to generate complex rhythms for use in design (Bovill 1996).

Table 2: Fractal geometry used for form creation in the fields of art and design

Art	Fine arts (painting and drawing, sculpture, ceramics, mosaics) Handcraft Decorative art	
Design	Architecture Fashion design Graphic design Industrial design	Interior design Landscape design Product design Urban design

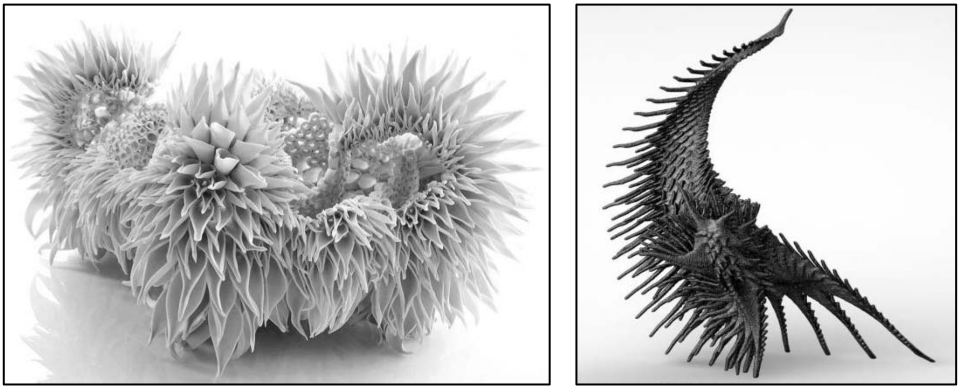


Figure 11: Fractal pattern in ceramic and sculpture

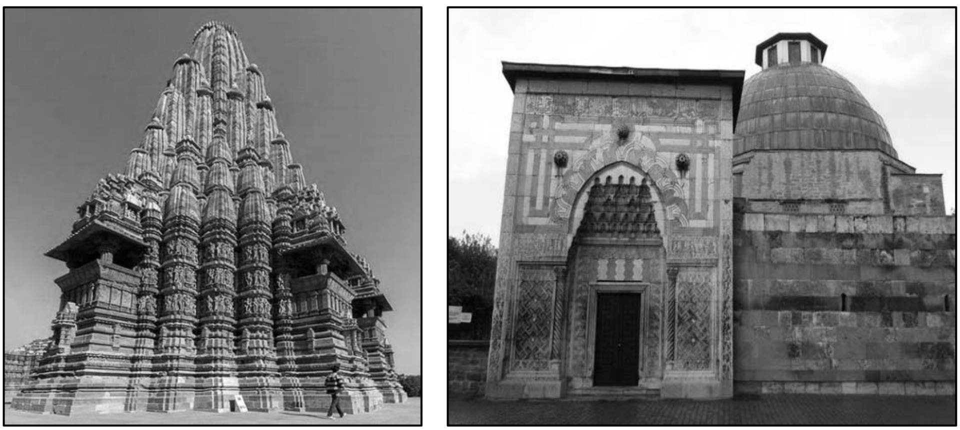


Figure 12: The Hindu Temple and Karatay Madrasah

New scientific achievements and modern techniques must not harm natural and built environment, but rather on the contrary, they should be the tools of their ecological integration. For this reason, we consider justified to shed new light on urban pattern design in accordance with new findings from other scientific disciplines. Fractal geometry is a relatively new scientific discipline which can provide new ways of visualization of the influence of decision-making on cities as well as new possibilities for a better city form through its application in urban pattern design. Various studies have shown that urban patterns have fractal characteristics in their structure (Fig.13), and that fractal geometry provides more appropriate models for the description of such space forms, rather than Euclidean geometry. The characteristics of urban patterns, such as heterogeneity, self-similarity and hierarchy, are essential features of fractal structures, too. On the other hand, fractals have the ability to summarize complexity, density and heterogeneity of space distribution in a single value-fractal dimension, which is independent of the scale (Jevrić et al., 2014). Cities and their activities and land uses clearly manifest forms which are self-similar and loosely alluded to in terms of fractals (Batty and Longley, 1994).

Palma Nuova, İtaly

Fort Bourtange, Netherlands

Figure 13: The fractal form town and village

In addition, fractal geometry reveals that some of the most austerely formal chapters of mathematics had a hidden face: a world of pure plastic beauty unsuspected till now (Mandelbrot, 1983).

4. APPLICATIONS OF FRACTAL GEOMETRY TO LANDSCAPE ARCHITECTURE

What is now understood is that many natural systems, entities and processes have an underlying order that displays a property known as scale invariance or self-similarity. This has been reflected by some landscape design academics and practitioners for a move towards a new design approaches using fractal geometry.

There are two ways that fractal concepts or fractal geometry can be used in landscape architecture. First, the fractal dimension, pattern can be measured and used as an analytical tool (the box counting method, the fractal dimension of a digital image, Fourier analysis and fractal analysis tools) for landscape planning (Perry, 2012). For landscape analysis, a versatile fractal method has been developed that provides both an estimate of the fractal dimension describing the concentration of pixels of a given cover type and a visualization of scale-dependent pixel density on a digital representation of the landscape (Milne, 1991). Second, fractal organization principles can be used to generate basic design principles for use in landscape design.

4.1. Fractal Case Studies in Landscape Design

Natural forms, as inspiration for design, are evident in art, architecture and landscape architecture throughout history (Perry et al., 2008). Landscape cannot be designed and represented adequately with Euclidian geometry, linear perspective, and isometric drawings: it requires fractal geometry and dynamic and multi-sensory representation as well (Koh, 2013).

Ian McHarg, in “Design with Nature”, first directed environmental designers to notice and buılt with environmental fitness in mind, so that fractal patterns could be preserved and woven throughout the built environment (Dinep and Schwap, 2010).

Fractal geometry can be provided endless possibilities for design analysis and methodology in landscape architecture. However, until recently, it was not understood that many natural forms and processes possess a common ordering characteristic-a characteristic described by the mathematics of fractal geometry (Perry et al., 2008). Therefore further study of fractal geometry should be conducted theoretically and practically. The growth in understanding of the mathematical properties of natural systems and processes has led some designers to suggest that fractal geometry, called the language of nature, could play a role in developing new landscape design approaches.

Although there has been significant interest in the application of fractal geometry as a tool for form creation in the fields of architecture and art, there has been no corresponding development in the field of landscape design. However, it seems that the unconscious use of fractal patterning by some designers may play a role in the aesthetic response a particular designed landscape evokes (Fig. 14), (Fig. 15), (Fig. 16) (Perry et al., 2008). But in recent years, some landscape designers have used conscious use of fractal geometry their designs. Fortunately, among the landscape professionals, fractal geometry has been applied in landscape design widely to investigate fractal structures, forms and design patterns. Two of them are Charles Jenks and Mikyoung Kim.

The Garden of Cosmic Speculation

The Garden of Cosmic Speculation is a sculpture garden created by landscape architect and theorist Charles Jenks at his home, Portrack House, near Dumfries in South West Scotland. The garden is inspired by science and mathematics, with sculptures and landscaping on these themes, such as Black Holes and Fractals (Fig. 17). The garden is not abundant with plants, but sets mathematical formulae and scientific phenomena in a setting which elegantly combines natural features and artificial symmetry and curves. It is probably unique among gardens, drawing comparisons with a similarly abstract garden in Scotland, Little Sparta (Anonymous, 2016).

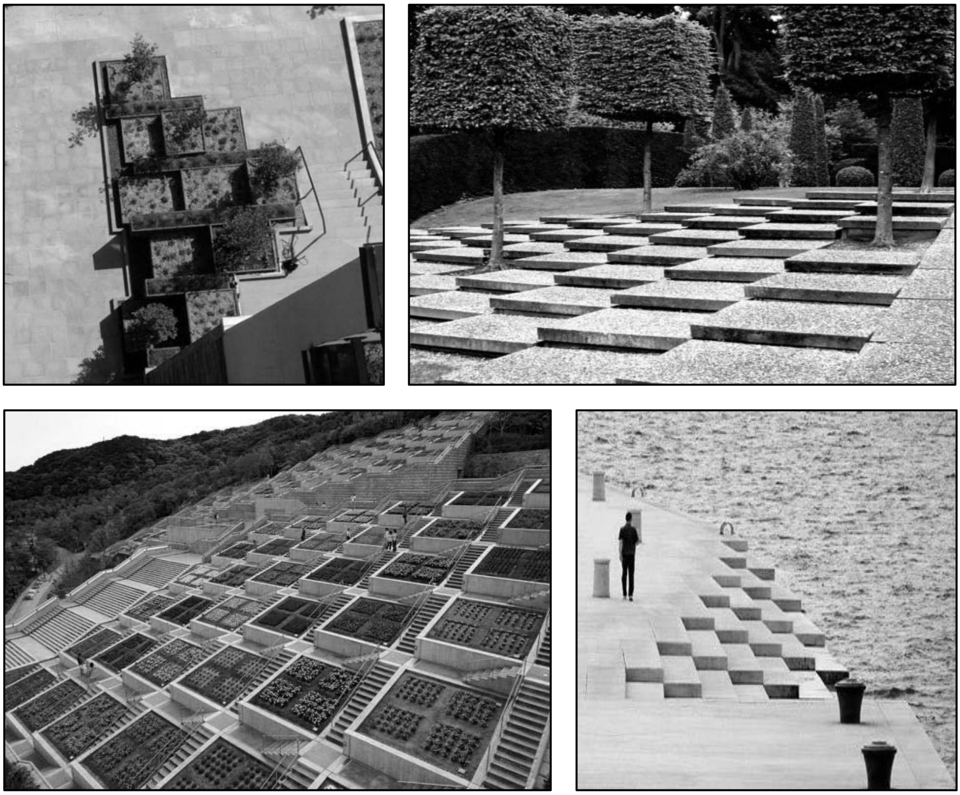


Figure 14: The unconscious use of fractal patterning

Figure 15: The unconscious use of fractal form as a water canal

Mikyoung Kim's Fractal Landscapes

Fractals relate to Mikyoung Kim's creative process. Just as at the broad scale or the aerial view it can be seen human behavior patterns, at the molecular scale, she is thinking of "one person, and their multi-sensory experience within that place." However, having said all of that, Kim also believes that landscape architects "can't predict how a public space will be used and allow for flexibility".

Figure 16: The unconscious use of fractal form in the parks

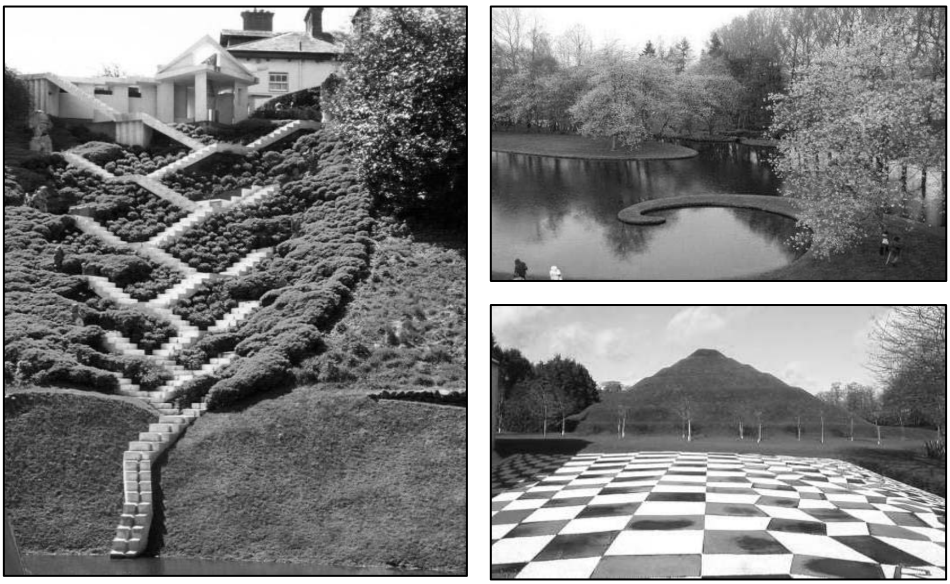


Figure 17: The Garden of Cosmic Speculation; fractal stairs, lake and terrace

Kim's a few projects that show her attention to both the broad and human scales, and how they fit together into a system:

- ChonGae Canal Source Point Park: Sunken Stone Garden, South Korea.
- Farrar Pond Residence (Fig. 18)
- 140 West Plaza: Exhale
- The Crown Sky Garden: Ann & Robert H. Lurie Children's Hospital of Chicago (Fig. 18), (Anonymous, 2016a).

Figure 18: Farrar Pond Residence and the Crown Sky Garden

4.2. A Generative Approach Based on Fractals in Landscape Design

Fractal geometry describes the complex and dynamic forms and patterns rather than Euclidean geometry. The dynamic interplay between chaos and order is endlessly repeated within the depths of each two and three-dimensional design (Berkowitz, 1998). The growth in understanding of the dynamic processes and the resultant scale-invariance of natural systems, led some designers to suggest that fractal geometry could become a referent for these new design forms and an aesthetic that embodied the forms and dynamics of natural systems. Increase knowledge and understanding of how fractal geometry can be used as a referent for future design forms and the articulation of an aesthetic that can characterize an ecological based approach to landscape design (Perry, 2012). The properties of some well-known fractals can be applied usefully in urban pattern design regarding the distribution of free areas/green areas and their size, urban sprawl or hierarchy of traffic networks (Jevrić et al., 2014).

Fractal geometric properties as a design tool it is essential to consider the detailed structural form of the component of design elements and principles. Fractal organization principles can be used to generate basic design elements and principles for use in landscape design. Geometric characteristics of fractal are summarized as symmetry, self-similarity, non-linearity, and randomness contributes in analyzing irregular patterns of nature, and it has functionality as creative formative principles

(Table 3).

Landscape design, concerned with control over basic design elements and principles, can benefit from the use of fractal geometry. In developing fractal geometry in landscape design, some rules about what forms and functions are located where, must be used. Landscape design approach through fractal geometry leads to important insights about form and function. It is said that “form follows function” in landscape design, and fractal geometry shows how form follows function.

In the cases where fractal formative principles applied to landscape design:

- Symmetry of fractal emphasizes a basic composition principle of a certain form.
- Self-similarity of fractal can discover existing in flow of nature and then show a possibility of organic landscape design.
- Non-linearity of fractal emphasizes a new meaning of landscape design as an increasing complexity.
- Randomness of fractal shows that non predictive creative results can be obtained by sudden emergence and instability brought by repeated non-linear forms (Table 3).

Table 3: Geometric characteristics of fractals that used basic design and landscape design

Characteristics	Basic design	Landscape design	
Symmetry-Asymmetry	**Elements:** direction, form, movement, scale, shape, space, texture, value	organic non predictive increasing complexity visually unlimited extension	Form Function
Self-similarity	**Principles:** alignment, balance, emphasis, contrast, harmony, hierarchy, pattern, proportion, repetition, rhythm, symmetry, unity		
Non-linearity			
Randomness			
	FORM follows **FUNCTION**		

Landscape architectural design styles have changed in the last years, the application of the principles has not needed to change, which demonstrates their fundamental role as basic design principles. The core strategy is to expand the feasibility of new shape of landscape structures by using a rule-based design development process supported by fractal geometry.

5. DISCUSSIONS and RESULTS

Landscape design approaches has begun to change faster than ever. During this change the landscape designer is under the influence of many factors. Among these factors are evolution of computer technologies and new generative design systems. Contemporary landscape architecture uses CAD (Computer Aided Design) softwares (AutoCAD, Revit, 3DS Max, ArchiCAD, Lumion, SketchUp, Allplan, Blender 3D, etc.) that enable landscape designers to easily create complex shapes. Among the new generative systems, fractal geometry permits the easy creation of design alternatives using computer and software. Computer softwares are fast becoming a new medium for simulation using fractal geometry in the landscape design. As a part of landscape design using 3D computer graphics modeling and rendering applications it is also essential to compare as many design alternatives as possible.

Although fractal geometry can be used to analyze the complex patterns of nature and urban for the landscape planning, the application of fractal geometry to landscape design undefined. Nowadays, different design approaches are being used in the formation of landscape design. Especially only one of them is also fractal geometry. Fractal geometry will be a particularly creative part of landscape design. Fractal geometry is to play an important role in landscape design and will progress in the future. Computer technologies lead to various forms of utilization in landscape design, necessitating creative process to be fictionalized.

Sustainable landscape design solutions must contain cultural systems and natural systems connections. So fractal geometry has a huge potential of landscape design. Fractal geometry is an example of a technology that reaches into the core of design composition, allowing the landscape designer to express a complex understanding of nature.

Fractal geometry has emerged in direct response to the need for better mathematical descriptions of design, and there is little doubt that it provides a powerful tool for interpreting natural forms and systems. Because of its geometric nature the idea will gain its popularity with landscape designers.

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Chapter 12

Cultural Landscapes as Heritage: A Landscape-Based Approach to Conservation

Ayşegül TANRIVERDI KAYA*

INTRODUCTION

What is landscape? Cultural landscape?

The last ten decades have seen an incredible growth of cities. It is significant that more than half of the world's population now live in cities. According to UN-Habitat, in the next two decades, five billion people will be living in cities. Therefore, due to this mass urbanization and its consequences, over the past two decades international interest and attention has been focused on urban areas. At the same time, the way of looking at cultural heritage conservation has been changed. Firstly, the approach in the field of conservation was merely on monumental buildings and artifacts rather than on their settings and their values and meanings according to the belief systems of the inhabitants, all of which constitute cultural landscapes. Cultural landscapes are distinctive landscapes which evoke the intimate relationships of human beings with their natural environment and which reflect the combined work of man and nature. Moreover, they embody the collective memory of humanity (Banderin & Oers, 2012).

This study analyzes the changing approach to heritage management and points to the new tendency to base landscape approach on heritage management. Thus, first to be discussed are the meanings of "*landscape*" and "*cultural landscape*." According to the European Landscape Convention definition, the landscape is "*an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human*". Another important quote from this convention defines landscape protection as "*action to conserve and maintain the significant or characteristic features of a landscape, justified by its heritage value derived from its natural configuration and/or human activity*" (Bloemers, 2010).

The descriptions of "*10 different versions of the same scene*" were noted while observing the reactions of people to ordinary landscapes. Cultural geographers, planners, landscape architects, biologists, ecologists, archaeologists, psychologists, ethnologists, and others have written about landscapes from the perspectives of their disciplines and professional interests. This diversity of perspectives on landscape creates a challenge for identifying cultural landscapes (Buckle, 2004).

The landscape can be considered as a perspective which leads to the view on heritage as the outcome of transformations and opens integrative and participatory approaches and challenging vistas. Because of the dynamic interactions between humans and nature, landscapes change; thus, they are the remnants of culture and nature from the past, and thereby our basic heritage. As a consequence, information on landscapes gives an opportunity to understand and conserve the built heritage and can

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also be a guide to future design. There is also more than can be seen in the various layers of landscape, which can be likened to a palimpsest. Landscapes provide the setting for our habitus. Whether of aesthetic value or not, they link people to nature and establish interaction with the environment. Because the existence of tangible and intangible values in landscapes belongs to humans, the landscape notion is highly cultural. Human beings are one element of nature, among others, and the presence of a wide variety of relations between humans and the landscape are expressed by the notion of cultural landscapes. The term "cultural" refers to the extended meaning of all the forms of these relations (Antrop 2005; Mitchell, Rössler & Tricaud, 2009; Tudor 2014).

To begin with, it is necessary to discuss what cultural landscapes are. The concept of a "*cultural landscape*" is not new. Landscape which was not strictly natural became a field of scientific research which can be traced to the early writings of geographers, mainly in the English, French and German schools of geography and related disciplines in the second half of the 19th century. Geographers evaluated the landscape in terms of time and place as they related to each other in a continuous process of development, dissolution or replacement. Because of this process, landscape was considered as having an organic quality. Moreover, their approach to landscape was distinctly anthropocentric, as human beings were a part of it, lived with it and modified it (Leighly, 1969).

In particular, the American geographer Carl Sauer developed the concept of cultural landscape in 1925 (Leighly, 1969). According to his approach, cultural landscape is a geographic area which is formed by all of the works of man that characterize the landscape. However, this definition neglects the energy, customs or beliefs of man. As shown Table 1, the type of population and their density and migration form landscapes. The type of structures used for housing and form on the ground, either dispersed as in many rural districts or agglomerated into villages or cities, have different plans and layouts. They all show the accumulation of knowledge and techniques of past lives. This approach can be summed up via the quote: "*The cultural landscape is fashioned out of the natural landscape by a cultural group. Culture is the agent, the natural area is the medium, the cultural landscape is the result*" (Leighly, 1969). This approach made it possible to link people with natural interactions that were not yet specified in terms of landscape and paved the way for the dedication of cultural landscapes to distinguished universal values (Mitchell *et al.,* 2009).

The United States National Park Service (USNPS) provides a definition of cultural landscapes that they put into practice with their programs. They define cultural landscape as "*a geographic area (including both cultural and natural resources, and the wildlife or domestic animals therein), associated with an historic event, activity, or person or exhibiting other cultural or aesthetic values*." This definition also emphasizes the broader definition of being "*impacted by human activity*." The USNPS classifies cultural landscapes into four major types: historic sites, historic designed landscapes, historic vernacular landscapes, and ethnographic landscapes. These are defined in Table 1 (Birnbaum, 1994).

Furthermore, Robert Melnick prepared the report of *Cultural Landscapes: Rural Historic Districts In the National Park Service,* which includes the following perspective: "*In a cultural landscape, the factor is culture, as it interacts, over time with the medium of the natural landscape finally resulting in the landscape we see and* *experience*" (Melnick, 1984). This definition is quite similar to Sauer's except that it includes consideration of visual perceptions and experience of the landscape. One of the most important advantages of Melnick's view is the description of the characteristics of the rural landscape and how these can be used for research and inventory of sites. Basically, Melnick's characteristics are the starting point for the assessment and mapping of cultural landscapes (Buckle, 2004).

Table 1. Typology used by the United States National Park Service to categorize landscapes (Birnbaum, 1994)

United States National Park Service: Landscape Typology
Historic Site
A landscape significant for its association with an historic event activity or person. Examples include battlefields and presidential properties.
Historic Designed Landscape
A landscape that was consciously designed or laid out by a landscape architect, a master gardener, architect, engineer, or horticulturist according to design principles, or an amateur gardener working in a recognized style or tradition. The landscape may be associated with a significant person, trend, or event in landscape architecture or illustrate an important development in the theory and practice of landscape architecture.
Historic Vernacular Landscape
A landscape that evolved through use by people whose activities or occupancy shaped it. Through social or cultural attitudes of an individual, a family, or a community, the landscape reflects the physical, biological, and cultural character of everyday lives. Function plays a significant role in vernacular landscapes. This can be a farm complex or a district of historic farmsteads along a river valley. Examples include historic rural districts and agricultural landscapes.
Ethnographic Landscape
A landscape containing a variety of natural and cultural resources that associated people define as heritage resources. Examples are contemporary settlements, sacred religious sites, and massive geological structures. Small plant communities, animals, and subsistence and ceremonial grounds are often components.

Additionally, the Canada National Capital Commission (NCC) developed a study about cultural landscapes intended to bring in a set of guidelines for the identification and assessment of cultural landscapes on NCC lands. This report outlines a methodology for search, analysis, identification of cultural landscapes, and suggests related management strategies. The key essence in a cultural landscape approach is to find out the relationship between people and landscapes in order to develop appropriate management tools. This relationship creates the identity, the sense of place and place attachment that form the concept of meaning and social values. Canada NCC defines cultural landscape as "*any geographical area that has been modified, influenced, or given special cultural meaning by people as a set of ideas and practices, embedded in a place”* and then goes on to classify three basic categories: designed, evolved and associative. This classification is similar to that of the UNESCEO World Heritage Convention (WHC, 1972). The NCC’s definition is used to comprehend the relationship between the intangible and tangible qualities of these sites and it brings in the notion of meaning in addition to the natural and cultural characteristics. A landscape may be important as a cultural landscape by virtue of its having sentimental or spiritual meaning for a group of people, whether or not there are any physical relics in the landscape (NCC, 2004).

Amos Rapoport discusses the cultural landscape in general as the subject matter of environment-behavior relations, and of traditional dwellings and settlements in particular. He argues that the cultural landscape is explained by discussing its two components - "*landscape*" and "*cultural*". All landscapes are lived in and are modified through human actions which give them meaning, and this makes them "*cultural*", since culture defines all human beings, while at the same time dividing them into groups. Cultural landscapes are the result of a complex history because the different populations and groups produce derivative interaction, over time, with a variety of physiographic and ecological specifics of the land (i.e., geographic, biotic, resource, social, and other opportunities and constraints). This interaction produces different and specific culture complexes called "*cultural landscapes*" (Rapoport, 1992).

According to Rapoport, cultural landscapes can be suggested as organizations of space, time, meaning and communication. Spatial organization reflects and influences communication among people; relationships among elements are as important as the elements themselves. Cultural landscapes must be understood as the result of a historic layering of cultural and natural values and attributes. It must be studied in its entirety and include the broader urban or vernacular context and setting. Any vernacular dwelling must be studied with its yard, streets, village, fields, and so on, and has to be considered together with the whole house/settlement system or system of settings. The origins of a cultural group and their impacts on landscape can often be identified not only through local dwellings, land use, field forms, street patterns, gardens and plants, but also through the names given to such things and places. Humanity continues to produce and changes the landscape by the help of technological improvements; thus, nowadays, a high-style landscape becomes influential in our life. The cultural landscape must be studied as the unit of analysis not only to look simultaneously at archaeological, traditional and contemporary landscapes, but also to examine relationships between high style and the vernacular, both of which may be very significant.. Moreover, perception of the landscape is not merely visual, but multisensory, including textures, smells, air movement, temperature, kinesthetics and sounds. The combination of all these perceptions is the distinctive feature of the landscape, and so provides the identity and ambiance of cultural landscapes (Rapoport, 1992).

Consequently, we can say that the term "*cultural landscape*" has been used with many different meanings because of the notion that cultural landscape indicates a wide variety of relations of populations with their environment and its natural elements. As a result, the term embraces four distinctive characteristics (Melnick, 1984; Tudor 2014; Mitchell *et al*., 2009; Bloemers, 2010; Rapoport, 1992), as listed in Table 2. In summary, a cultural landscape has:

- natural elements such as climate, soil, vegetation, geomorphology, and drainage, which are important components to understanding the backdrop of the cultural landscape. The natural environment provides the biological and ecological framework for the cultural landscape, *i.e.,* Natural Factors.
- a distinctive character that has proceeded from human cultural activity over

time. Cultural influences are the tangible results of changes such as settlements, transportation, land use, roads and boundaries as a combination of social, political and economic facilities*, i.e.,* Cultural/Social Factors.

- a meaning formed over time from layers of additional experience and feelings. The character is connected with meaning, *i.e.,* Cultural Association.
- a unique visual, aesthetic quality and authenticity due to natural and cultural relics, *i.e.,* Perceptional Aesthetic Factors.

MATERIALS AND METHODS

In the period following World War II, cities faced high rural migration flow, increasing car ownership and mass production of residential developments that threatened historic urban areas. A reaction to this ongoing destruction was generated in many countries resulting in an awareness of the need to conserving historic urban values. This conservation movement gradually suggested an understanding within a broader context. Consequently, a set of instruments and principles was established with the help of various charters and conventions.

Over the years the conservation prınciples and approaches towards heritage have changed. These changes are revealed and discussed in this study. How did the conservation process relating to landscapes evolve over the past decades? First, a literature review was conducted covering the concept of cultural landscapes as categorized into four distinctive properties in a matrix. Selected key doctrinal documents were then used in a comparative analysis with these distinctive properties in order to identify the context of conservation relevant to cultural landscapes.

The study examined selected regulations from the 1962 Paris UNESCO resolutions, including recommendations concerning the safeguarding of the beauty and character of landscapes and sites, up to the November 2011 UNESCO proposals concernıng the desirability of a standard-settıng instrument on historic urban landscapes. Their content was systematically analyzed using a descriptive-analytical method. Results were presented in a matrix, searched for and compared with the evolution of the subject of conservation. The results were correlated and the changes in the heritage conservation and management process were determined (Veldpaus & Roders, 2014).

The documents of the seven regulations analyzed and compared according to the assessment of the cultural landscapes are given in Table 3. They were selected as follows: first document, an initial recommendation concerned with landscapes (UNESCO, 1962) is a recommendation concerning the safeguarding of the beauty and character of landscapes and sites, which involves not only the natural beauty of places, but also urban landscapes as a man-made product. The Venice charter (ICOMOS, 1964) is a founding document within international principles, focused on the conservation of historic monuments and their settings. Later, the comprehensive document of the Washington Charter (1987) was the first international regulation exclusively dealing with historic urban areas and their conservation. In this sense, it brings in many important innovations in context of the urban heritage. By this time, awareness of the importance of intangible heritage had increased, and in 2003 the Safeguardıng of the Intangıble Cultural Herıtage Convention became an important addition to the international conservation policy.

Table 2. Distinctive characteristics of cultural landscape

Assessment	Sauer (1925)	Melnick (1984)	Rapoport (1992)	NCC (2004)
1-Natural Factors	Climate Land –Surface Drainage Mineral resources Sea and coast Vegetation	Physiographic context Topography-Vegetation Water resources Ecological context Hydrology-Soil Vegetation pattern	Geomorphology Hydrology Ecology Opportunities Constraints	Physical history- the shape and evolution of its natural resources- Natural components Ecological qualities
2-Cultural/Social Factors	Population Density Mobility Housing- plan Structure Production Communication	Spatial organization Land-use Circulation networks Boundary Cluster arrangement Structure Smallscale elements	Spatial organization Land use Circulation network Field layouts Fencing Settlements Buildings	Construction technology Spatial organization Design skills Distinctive way of life Spiritual or religious association
3-Cultural Association		History Anthropology studies	Symbolic-Habitual behavior resulting from culture, Tradition Toponomy	Myth, folklore, tradition, symbols, art, literature, music
4-Perceptional Aesthetic Factors		Views, sounds, scents	Sounds, smells Tactile textures Kinesthetic Air movement	

This Convention was different in that it recognized the role of identity and other intangible viewpoints in cultural landscapes and historic urban landscapes as well as in some others.

Table 3. List of regulations analyzed in this study

Organizations & Regulations	*Date*
UNESCO, Records of The General Conference, Twelfth Session, Paris, Resolutions, recommendatıon concernıng the safeguarding of the beauty and character of landscapes and sites.	*1962*
ICOMOS, International Charter for the Conservation and Restoration of Monuments and Sites	*1964*
ICOMOS, Charter for the Conservation of Historic Towns and Urban Areas (Washıngton Charter)	*1987*
UNESCO, Convention for the Safeguarding of the Intangible Cultural Heritage Paris	*2003*
UNESCO, International Conference, World Heritage and Contemporary Architecture	*2005*
ICOMOS, The Valletta Principles for the Safeguarding and Management of Historic Cities, Towns and Urban Areas	*2011*
UNESCO, Recommendation on the Historic Urban Landscape (HUL)	*2011*

The 2005, the Vienna Memorandum revised urban conservation policy and updated the Washington Charter approximately twenty years later. It provided the basis of the historical urban landscape approach (HUL). This memorandum is important because it reflects a change towards sustainable development in the management of historic cities and brings in a wider approach to urban heritage that embraces cultural landscapes. The 2011 Recommendation on the HUL has been the peak point of conservation policy over the years. The Recommendation brings to conservation a new vision by taking the social and economic functions of settlements or urban areas into consideration. Moreover, it seeks a change in order to maintain a balance between growth and quality of life.

Conventions, charters and recommendations relevant to cultural landscapes

In the 19th and 20th century the pioneer environmentalist movements began and in addition to landscapes becoming an important field of study, protection strategies were simultaneously developed within the protection movements. After the Second World War, the first international conservation achievement was realized. In 1962, a UNESCO "Recommendation Concerning the Safeguarding of the Beauty and Character of Landscapes and Sites" was accepted by the members. For the purpose of this recommendation, the beauty and character of landscapes and sites was taken to mean the preservation and, where possible, the restoration of the aspect of rural and urban landscapes and sites, whether natural or man-made, which had a cultural or aesthetic interest or form typical of natural surroundings (UNESCO, 1962).

The Recommendation mentioned the growing concern of the human negative impact on the beauty and character of landscapes and sites forming part of their natural environment, including damage by:

- Impoverishment of the cultural, aesthetic and even vital heritage,
- Cultivation of virgin land,
- Ill-regulated development of urban centers,
- Vast schemes for industrial and commercial development and equipment,
- Destruction of wildlife (UNESCO, 1962).

This document pointed out that the beauty and character of landscapes and sites play a crucial role in the life of humans, for whom they embody a physical, spiritual and moral regenerating influence. They are important universally known examples that bear witness to their age. Landscapes and sites are an important factor in the economic and social life of many countries, and are largely valuable in ensuring the health of their inhabitants. The General Conference requested that member states bring this recommendation to the attention of the authorities and bodies concerned with the protection of landscapes and sites and with regional development (UNESCO, 1962). The safeguarding of landscapes and sites should be ensured by use of the following methods:

- General supervision by the responsible authorities,
- Insertion of obligations into development plans and planning at all levels, regional, rural and urban,
- Organizing of extensive landscapes by "zones",
- Organizing of isolated sites,
- Creation and maintenance of natural reserves and national parks; acquisition of sites by communities (UNESCO, 1962).

The 1964 International Charter for the Conservation and Restoration of Monuments and Sites adopted by ICOMOS is the basic document which frames the issue of urban conservation within a system of international principles. This document focused on historical monuments and their settings and emphasized that "*The concept of a historic monument embraces not only the single architectural work but also the urban or rural setting in which is found the evidence of a particular civilization, a significant development or a historic event. This applies not only to great works of art but also to more modest works of the past which have acquired cultural significance with the passing of time"*. The Charter emphasized that it was essential to preserve ancient buildings from changes and that restoration must be done to reveal the aesthetic and historic value of the monument. According to the Charter, conservation and restoration of monuments must have appeal to all the sciences and techniques which can support the safeguarding of the architectural heritage (UNESCO, 1964).

The Charter for the conservatıon of historic towns and urban areas (Washington Charter, 1987**)** was adopted by the International Council on Monuments and Sites (ICOMOS) General Assembly in Washington, DC, in October 1987. This charter emphasized that all urban settings, whether developed step by step over time or intentionally created, are an accumulation of the diversity of societies throughout history. This charter regards large or small cities, historic urban areas, including, towns and historic centers or quarters, together with their natural and man-made environments (Ahunbay, 1996). The values of traditional urban cultures are embedded into these areas which created them over the centuries; however, today, many such areas are being threatened, physically damaged or even destroyed by the results of the urban development that followed industrialization in societies everywhere (ICOMOS, 1987).

The conservation of historic towns and historic urban areas should be an integral part of compatible policies of economic and social development and of urban and regional planning at every level. These historic towns also have qualities which express their identity and character, which must be preserved, especially:

- Urban patterns as defined by lots and streets,
- Relationships between buildings and green and open spaces,
- The appearance of buildings as defined by scale, size, style, construction, materials, color and decoration,
- The relationship between the town or urban area and its surrounding setting, both natural and man-made,
- The various functions that the town or urban area have acquired over time (ICOMOS, 1987).

The Charter suggests that planning for the conservation of historic towns and urban areas should be carried out by employing multidisciplinary studies. Conservation plans must handle all relevant disciplines including archaeology, history, architecture, sociology and economics. All those professions related to conservation should provide specialized training and meanwhile, a general information program should be set up for all residents ın order to encourage their participation and involvement, beginning with children of school age (ICOMOS, 1987).

The 2003 Convention for the Safeguarding of the Intangible Cultural Heritage is also relevant to cultural landscapes. UNESCO adopted this convention referring to the Universal Declaration of Human Rights of 1948, the International Covenant on Economic, Social and Cultural Rights of 1966, and the International Covenant on Civil and Political Rights of 1966. The purposes of this Convention are:

- to safeguard the intangible cultural heritage,
- to ensure respect for the intangible cultural heritage of the communities, groups and individuals concerned,
- to raise awareness at the local, national and international levels of the importance of the intangible cultural heritage, and to ensure mutual appreciation thereof,
- to provide for international cooperation and assistance.

The Convention defines intangible cultural heritage as the "*practices, expressions, knowledge, skills – as well as the instruments, artifacts and cultural spaces associated therewith – that communities, groups and, in some events, individuals recognize as part of their cultural heritage*". The definition also points out that it:

- is transmitted from generation to generation,
- is constantly recreated by communities and groups in response to their environment, their interaction with nature and their history,
- provides them with a sense of identity and continuity,
- promotes respect for cultural diversity and human creativity,
- complies with international rights regulations (UNESCO, 2003).

The Vienna Memorandum on World Heritage and Contemporary Architecture conveyed the notion of Historic Urban Landscape (HUL) which "*refers to ensembles of any group of buildings, structures and open spaces, in their natural and ecological context, including archaeological and paleontological sites, constituting human settlements in an urban environment over a relevant period of time, the cohesion and value of which are recognized from the archaeological, architectural, prehistoric, historic, scientific, aesthetic, socio -cultural or ecological point of view. This landscape* *has shaped modern society and has great value for our understanding of how we live today. The historic urban landscape is embedded with current and past social expressions and developments that are place – based".* This document defines the composition of urban landscapes that include spatial organization and land uses, visual relationships, topography, vegetation, and all elements of the technical infrastructure, including small-scale objects and details of construction (UNESCO, 2005). According to the Vienna Memorandum, HUL provides a connection between nature and the man-made environment in a historical continuity.

The Valletta Principles for the Safeguarding and Management of Historic Cities, Towns and Urban Areas was adopted by the 17th ICOMOS General Assembly on 28 November 2011. These principles updated the approaches and considerations contained in the Washington Charter (1987) and the Nairobi Recommendation (1976), based on the existing set of reference documents. The Assembly redefined the objectives, attitudes and tools needed. The updates emphasized a broader context of the issue of historic heritage on a regional scale rather than being confined to urban areas, of intangible values such as continuity and identity, of traditional land use, the role of public space in communal interactions, and of other factors such as those of integration and environment. The new approach questioned the role of landscape as common ground, or evaluation of the townscape, including its topography and skyline, as a whole. Another important issue, especially in fast-growing cities, took into account the problems of large-scale developments, which alter the traditional lot sizes and threaten the unity of historic urban morphology (ICOMOS, 2011). This document points out the elements to be preserved, and includes:

- The authenticity and integrity of historic towns all their tangible and intangible elements,
- The relationships between the site and the parts making up this context,
- Social fabric, cultural diversity,
- Minimized consumption of the non-renewable resources and encouragement of their reuse and recycling (ICOMOS, 2011).

The Recommendation of the HUL, which was adopted on 27 May 2011 at the UNESCO Headquarters, noted that historic urban areas are among the most numerous and diverse expressions of our common cultural heritage, shaped by generations and constituting a key assertion of humankind's endeavors and aspirations through space and time. However, under the processes of demographic shifts and globalization, as well as climate change, cities have been subject to rapid and uncontrolled urbanization. This has frequently resulted in social and spatial fragmentation and in a drastic deterioration of the quality of the urban environment and of the surrounding rural areas. This approach addresses the policy, governance and management concerns involving a variety of stakeholders, including local, national, regional, international, public and private actors in the urban development process (UNESCO, 2011).

The Recommendation defines the historic urban landscape as *"the urban area understood as the result of a historic layering of cultural and natural values and attributes, extending beyond the notion of 'historic center' or 'ensemble' to include the broader urban context and its geographical setting*". This wider definition denotes the geomorphology, topography, hydrology and natural features of the site, in addition to built environments, both historic and contemporary, open spaces and gardens, land use and spatial organization, perceptions and visual relationships, as well as all other elements of the urban or rural structure. It also includes social, cultural and economic values, and the intangible dimensions of heritage as related to diversity and identity (UNESCO, 2011).

The Recommendation addresses the landscape approach for conservation taken from the International Union for Conservation of Nature (IUCN) and the World Wide Fund for Nature (WWF). This approach is a model for making landscape-level conservation decisions, which suggests assessment of the historic areas within their broader urban context by considering the mutual relationships of their physical forms, spatial organization, their natural features and settings, and also their social, cultural and economic values. When the landscape-based approach is applied to historic cities and towns, a more holistic sense of scale can be obtained beyond the architecture of cities. The historic urban landscape is a sort of wide lens for understanding the city, as an outcome of natural, cultural and socio-economic processes that construct it spatially. It is not only about buildings and spaces, but it is also about rituals and meanings that people bring together into the city. This concept comprehends layers of symbolic significance, intangible heritage, perception of values, and interconnections between the composite elements of the historic urban landscape, as well as local knowledge including building practices and management of natural resources. Its value resides in the notion that it embodies a capacity for change. The landscape-based approach refers to the necessity of interdisciplinary action, and there is an acceptance that conceiving the city as a cultural landscape would help in revealing other sets of tangible elements (UNESCO, 2011; Banderin & Oers, 2012).

The World Heritage Convention and cultural landscapes

The notion of *Heritage* as an idea revived with the establishment of modern nation states after the world wars. The new nation states needed to define their own identities. Inıtially this new approach did not concern the historic city at all, but was merely focused on monumental buildings. Therefore, urban conservation as a modern idea has evolved from the 19th century to the present (Banderin & Oers, 2012).

After World War II, the idea of creating an international movement for protecting heritage emerged, protection ideas were converted to a national legislation and the first international conservation guide took shape. UNESCO assisted the convention managed by the World Heritage Committee (WHC) in Paris in 1972. The committee consisted of 21 countries and was concerned with the protection of world cultural and natural heritage. The Committee's purpose was to encourage countries to sign the World Heritage Convention and to ensure the protection of their natural and cultural heritage.

UNESCO defines heritage as *"the designation for places on Earth that are of outstanding universal value to humanity and as such, have been inscribed on the World Heritage List to be protected for future generations to appreciate and enjoy. Heritage is our legacy from the past, what we live with today, and what we pass on to future generations. Our cultural and natural heritages are both irreplaceable sources of life and inspiration"* (WHC, 1972).

The WHC pointed out at the convention that cultural heritage and natural heritage were increasingly threatened with destruction, not only by the traditional causes of decay, but also by changing social and economic conditions which were causing damage or destruction. However, natural and cultural places were brought together under a framework. At the beginning, there was no guidance on how they were recognized. When the cultural landscapes were put in the world heritage context, the cultural criteria were broadened because cultural landscapes cover a variety of interactions between humankind and the natural environment. The Committee added three categories of World Heritage Cultural Landscapes to the list in 1992 (Table 4).

Cultural landscapes can be seen as a documentary that shows the evaluation of human society historically. They contain special techniques of sustainable land use and accumulation of rules, norms and ideas over time. They can maintain natural values and biological diversity, so they must be protected in order to pass on the knowledge to future generations.

Table 4. Typology of World Heritage Cultural Landscapes

UNESCO Cultural Landscapes Categories
1. Clearly Defined Landscape
Landscape designed and created as a result of intentional human intervention, This embraces garden and parkland landscapes constructed for aesthetic reasons, which are often (but not always) associated with religious or other monumental buildings and ensembles.
2. Organically Evolved Landscape
Results from an initial social, economic, administrative, and/or religious imperative and has developed its present form by association with and in response to its natural environment Such landscapes reflect the process of evolution in their form and component features. They fall into two sub-categories:
Relict Landscape
A relict (or fossil) landscape is one in which an evolutionary process came to an end at some time in the past, either abruptly or over a period of time. Its significant distinguishing features are, however, still visible in material form.
Continuing Landscape
A continuing landscape is one which retains an active social role in a contemporary society closely associated with the traditional way of life, and in which the evolutionary process is still in progress. At the same time it exhibits significant material evidence of its evolution over time.
3. Associative Cultural Landscape
Justifiable by virtue of the powerful religious, artistic, or cultural associations of the natural element rather than material cultural evidence, which may be insignificant or even absent

RESULTS AND DISCUSSION

Change of the conservation context

When the conservation process was examined from 1962 to the present, it was seen that the conservation policy suffered from the derivation of architectural conservation principles. At the beginning, the monument and its restoration was the main problem. First, the aim was to preserve and tolerance to change was limited, so conservation policy was focused only on restoration, with no approval for modifications if required, which precisely meant the reuse of heritage without changing the essential quality. Comparing the documents has shown that new regulations are completing the older ones. In time, the understanding of changes and the general scope of conservation will widen the comprehensive system formulated by the historical, geomorphologic and social relationships of man with his environment. Therefore, it can be admitted that the most important evaluation is that of the toleration of change (Table 5).

Heritage is taken as a broad concept which includes the natural environment as well as cultural –social factors. In this sense, it is fundamental to consider heritage as an essential resource and part of the urban ecosystem. It embraces urban or rural settlements with their cultural practices, picturesque value of landscapes as well as biodiversity and living experiences. Furthermore, it is concerned with the identity and collective memory of settings (UNESCO, 2011).

The approaches and considerations contained in the Charters and Recommendation based on the existing set of reference documents have been updated over the decades and these modifications reflect a greater awareness of the issue of historic heritage on a wide territorial scale rather than just narrowed down to urban settlements, of intangible values such as continuity and identity; of traditional land use, the role of public space in communal interactions, and of other socioeconomic factors such as integration and environmental factors. The role of landscape as common ground, to deal with urban-rural interactions and the conceived townscape, including its topography and skyline, as a whole, seem more important than before (UNESCO, 2011). At the beginning, the monuments alone were the basic issue, and then it was realized that monumental sites and their settings go together, and it was accepted that rural and urban settlements are made up of tangible and intangible elements. The tangible elements include, in addition to the urban structure, architectural elements, the landscapes within and around the town, archaeological remains, panoramas, skylines, view-lines and landmark sites. Intangible elements include activities, symbolic and historic functions, cultural practices, traditions, memories, and cultural references that constitute the substance of their historic value (ICOMOS, 2011). All these elements can be characterized in context of the cultural landscapes (Table 6).

Change of heritage management

The last 10 years of conservation policy comes to the conclusion that there have been dynamic changes in our rural and urban areas, and these changes have made the historical areas vulnerable. Dynamic changes and developments such as rapid and uncontrolled urbanization, mass transportation etc. are a result of social and spatial fragmentation and the drastic deterioration of the rural areas surrounding urban areas. The management of these changes needs to be precise, with understanding and careful consideration; in addition, it needs to take a culturally and historically sensitive approach, utilizing stakeholder consultations and expert know-how. Therefore, the management of heritage needs interdisciplinary participation. The principal actors ın the process of heritage management are governments, public service providers and those of the private sector, international organizations, and national and non-governmental organizations. The concepts of sustainability, climate change, and tolerance to change are handled by a variety of stakeholders, government, public and private actors in the process seeking a wide involvement in heritage management. Moreover, the UNESCO (2011) Recommendation advised the member states to adopt these strategies into their national development policies and agendas.

Table 5. Comparative analysis matrix of regulations

Conservation	Paris 1962 Recommendation	Venice Charter 1964	Washington Charter 1987	Intangible Cultural Heritage 2003	Vienna Memorandum 2005	Valetta Principles 2010	HUL Recommendation 2011
WHAT is context	Natural landscapes Sites& Urban landscape	Conserving and restoring monuments	Historic character of the town or urban area,	Oral traditions and expressions; Performing arts; Social practices, rituals and festive events; Knowledge and practices concerning nature and the universe; Traditional craftsmanship	Historic cities as well as to larger cities that have World Heritage monuments and sites within their urban territories	Historic cities, towns, urban areas Tangible and intangible values, Social fabric, cultural diversity	Natural features Historical urban landscape, Social, economic, and cultural values Settings
WHO is involved	• Authorities;	• Scientific expert • Professional expert	• Professionals	• communities, groups • relevant nongovernmental organizations • experts and practitioners	• Experts • Professionals,	• Elected authorities, municipal services, • Public administrations, • Experts, • Professional organizations, • Voluntary bodies, universities,	• Politicians, Local authorities, Scientific experts Professional experts, • Non-governmental organizations

Table 5. (Continued) Comparative analysis matrix of regulations

Conservation	Paris 1962 Recommendation	Venice Charter 1964	Washington Charter 1987	Intangible Cultural Heritage 2003	Vienna Memorandum 2005	Valetta Principles 2010	HUL Recommendation 2011
HOW is protected	• Corrective measures should be aimed at repairing the damage caused to landscapes and sites and, as far as possible, restoring them to their original condition	• restoration is a highly specialized operation to preserve and reveal the aesthetic and historic value of the monument	• Conservation Plans	• Provide continuity and respect cultural diversity	• Restoration • Conservation plans • Management plans	• Management Plan is a document specifying in detail all the strategies and tools to be used for heritage protection and which at the same time responds to the needs of contemporary life. • Change can be an opportunity to improve the quality of historic towns and urban areas on the basis of their historical characteristics.	• to prioritize actions for conservation and development; • conservation has become a strategy to achieve a balance between urban growth and quality of life on a sustainable basis.
HOW is managed	• Laws and regulation • Urban development plans, • Scheduling of extensive landscapes by "zones" • Acquisition of sites by communities.	• Preservation, restoration • Consolidation	• Conservation plans must address all relevant factors including archaeology, history, architecture, techniques, sociology and economics	• Non-governmental organizations, • promoting the function of the intangible cultural heritage in society, Planning programs foster scientific, technical and artistic studies,	• Management Plan, according to the Operational Guidelines for the Implementation of the World Heritage Convention.	• A conservation plan, including analysis of archaeological, historical, architectural, technical, sociological and economical values. • A management plan	• Interdisciplinary cooperation, governance and a variety of stakeholders, including local, national, regional, international, public and private actors in the urban development process.

Table 6. Context of analyzed regulations relevant to cultural landscapes

Conservation	Natural Factors	Cultural/ Social Factors	Cultural Association	Perceptional Aesthetic Factors
Paris 1962 Recommendation	✓	✓		
Washington Charter, 1987		✓		
Intangible Cultural Heritage , 2003			✓	
Vienna Memorandum 2005		✓	✓	
Valetta Principles 2010		✓	✓	✓
HUL 2011 Recommendation	✓	✓	✓	✓

CONCLUSION

It can be understood from the analysis of the regulations that historical settlements have seen not only the unity of architectural monuments, but also their layers of meanings connected to the natural environment and to the geological structure. This approach aims to integrate the planning of urban development and the heritage conservation process and to generate a landscape-based approach to conservation and urban planning. This can be a way to balance urbanism with nature and the expression of history with the needs of modern life. The goal is an integrated ecosystem that adopts the relationships and exchanges between the urban area and the surrounding landscape. The regulations when analyzed exhibit a continuum and a step-by-step debate of an integrated approach linking contemporary architecture, sustainable urban development and landscape integrity based on existing historic relics and modern settlements within a broader context. Historic city meets globalization and urban heritage conservation points to conservation and development together in the theory and practice of urban planning. The key factor for the conservation of the historic city is the establishment of a balanced, integrated and sustainable management process.

The 2011 HUL Recommendation is the pinnacle of the conservation agenda. It proposed a landscape approach for historical areas within their broader urban context in order to identify, conserve and manage them. The Recommendation considers the relationships between natural features, settings and social, cultural and economic values.

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Chapter 13

Mycorrhiza and Its Role in Landscape Architecture

Müberra PULATKAN*

1. MYCORRHIZA

Roots, which are nonvisible parts of the plants, serve various functions. They are responsible for actions such as stabilizing the plant into the ground and providing it with water and nutrients. At the same time, when they die, they provide valuable organic nutritional material for the soil. These characteristics of the roots affect physical and chemical structure and biological activities of the soil (Varma, 1998).

The word mycorrhiza was created by the combination of the Greek words “mykes” that means fungus and “rhiza” that means root, and in literature it means “root fungus.” Frank defined the symbiotic relationship between the plant roots and fungi using the term “mycorrhiza” in 1885 (Powell and Bagyaraj, 1984; Raina et al., 2000).

Mycorrhiza is the most prevalent synergy between plant roots and microorganisms. This synergy creates a line between the soil and the plant, playing a significant role in nutrient and water transaction (Marschner, 1995; Mukerji et al. 2000). While mycorrhiza helps the plant to receive minerals and water in the soil effectively, plant provides the necessary carbohydrates for mycorrhizal development (Koide and Schreiner, 1992; Smith et al., 1993; Davies, 2000). Mycorrhiza extends the root surface area of the plant, and thus, promotes the development of plant roots to facilitate nutrient and water intake from the soil. Furthermore, it increases the resistance of the plants against aridity, decreasing their irrigation and fertilization needs. In addition, it protects plant roots from the adverse effects of soil pathogens. Thus, while mycorrhiza supports plant root development on one hand, on the other it facilitates nutrient and water intake of the roots (Marschner ande Dell, 1994; Azcon et al, 1996; Davies, 2000).

Mycorrhiza is quite effective on soil structure and moisture. It regulates soil structure and increase water holding capacity of the soil (Auge et al., 2001; Davies, 2000). Furthermore, it was reported that mycorrhiza increases hydraulic connectivity of the roots and plant’s resistance against drought stress (Azcon et al., 1996). As hydraulic conductivity of the roots increase and movements become active and transpiration and photosynthesis activities increase. These effects are stated to increase parallel to the mycorrhiza induced increase in phosphorus (P) levels (Levy and Krikun, 1980; Allen, 1982; Allen et al., 1981).

In arid areas where soil moisture is low, the ability of the plant to receive nutrients, especially phosphorus (P) from the soil is reduced. Under such circumstances, mycorrhiza carries phosphorus that is inactive in the soil towards the consumption zone near the plant root with the help of its hypha and spores that develop in the soil and actively facilitates its intake by the roots (Gianinazzi-Pearson and Gianinazzi, 1983; Cooper, 1984; Smith and Gianinazzi-Pearson, 1988; Jakobsen et al. 1992). Furthermore, in addition to P, it

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increases the intake of nutrient elements such as K, Ca, Mg, Fe, Cu, Mn, Zn and N (Kothari, 1990; Bolan, 1991; Tobar et al., 1994; Smith and Read, 1997; Mukerji et al., 2000).

In 1885, Frank divided mycorrhiza into two large groups of ectotrophic and endotrophic mycorrhiza. These terms are used as ectomycorrhizal and endomycorrhizal today (Raina et al., 2000; Hopkins and Hüner, 2004). In recent years, mycorrhiza is defined under 7 groups based on the different types of locations that mycorrhiza are found between or inside plant root cells (Harley and Smith,1983; Bagyaraj, 1991; Smith and Read, 1997)

1. Ectomycorrhiza
2. Endomycorrhiza (Vesicular-Arbuscular Mycorrhiza)
3. Ectendomycorrhiza
4. Arbutoid Mycorrhiza
5. Monotropoid Mycorrhiza
6. Ericoid Mycorrhiza
7. Orchidoid Mycorrhiza

Several mycorrhizae with the exception of ectomycorrhiza penetrate into the root cells. While monotropoid mycorrhiza penetrates into the root cells in the form of little protrusions, ericoid, arbutoid and orchidoid mycorrhizae cover the cells with curving hypha (Srivastava et al., 1996). Status of different mycorrhizae within plant roots is displayed in Fig.1.

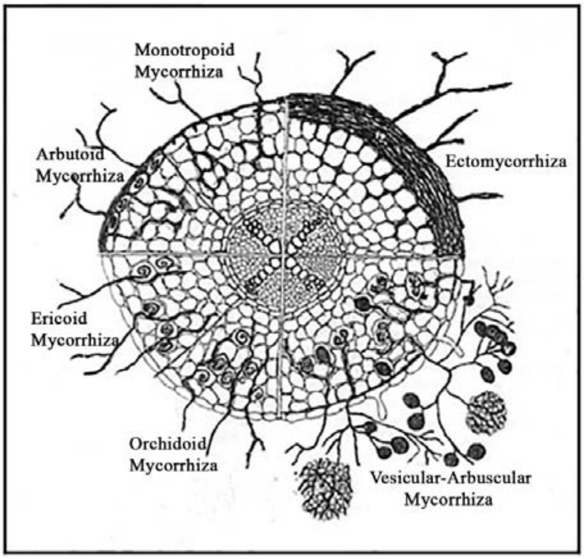

Figure 1: Different types of mycorrhiza (Raina et al., 2000).

1.1. Ectomycorrhiza

Fungi that do not penetrate the root cells, but spread around these cells are defined as ectomycorrhiza (Raina et al., 2000). Ectomycorrhizae enter the cortical and epidermal intercellular spaces by forming a network system called "Hartig's net" (Bonfante-Fasolo and Scannerini, 1992; Srivastava et al., 1996; Davies, 2000; Dodd, 2000; Hopkins and Hüner, 2004). They develop between the outermost cells of the roots by holding the root surface with little rootlets in the form of an overlay called mantles (Figure 2) (Marschner, 1995; Dodd, 2000; Gregory, 2006). These rootlets, especially in soil that contain poor nutrients, could extend into the soil, enabling the plant to benefit from the water and nutrients in the depth (Jeffries and Dodd, 1991; Peterson and Bonfante, 1994).

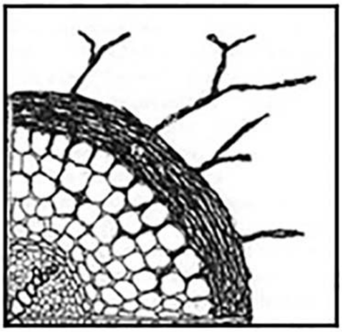

Figure 2. Ectomycorrhiza (Raina et al., 2000).

The ability of non-mycorrhizal plants to receive stationary nutrients in the soil is quite limited (Miller and Allen, 1992). Ectomycorrhizae increase the performance of the plant in receiving stationary nutrients such as phosphorus (Harley and Smith, 1983; Bonfante-Fasolo and Scannerini, 1992). Furthermore, they could conduct direct nutrient transfer from decomposing foliage residue (Raina et al., 2000; Sylvia, 2003). Ectomycorrhiza positively affects the nutrient and water transfer between the forest soil and roots. In addition, it enables forest soil to remain continuously fertile and protects the plants from heavy metals (Lynch and Bragg, 1985).

Ectomycorrhiza develops especially in nutrient-poor and water deficient arid soils (Dix and Webster, 1995).

Ectomycorrhiza is predominantly found in broad-leaved and coniferous forest trees (Dix and Webster, 1995; Srivastava et al., 1996). It is found in the roots of several plants that belong to *Pinaceae*, *Cupressaceae*, *Fagaceae*, *Betulaceae* and *Myrtaceae* genera (Salisbury and Ross, 1992; Raina et al., 2000; Sylvia, 2003). Furthermore, it was reported that the existence of ectomycorrhiza is one of the characteristics of tropical climate plants (Raina et al., 2000).

1.2. Ectendomycorrhiza

Ectendomycorrhiza is similar to ectomycorrhiza and endomycorrhiza in certain structural characteristics (Smith and Read, 1997). However, it is different from ectomycorrhiza with its quite thin mantle or the lack of it and its intracellular penetration in addition to intercellular penetration (Srivastava et al., 1996; Sylvia, 2003; Wilcox, 1984).

They are found in the roots of coniferous plants. Furthermore, they are formed in the roots of certain broad-leaved plants (Smith and Read, 1997; Srivastava et al., 1996).

1.3. Arbutoid Mycorrhiza

Arbutoid mycorrhizae only penetrate into epidermal cells and curved inside like a spiral. They cover the roots with the cover system called mantle and it was reported that they extend into intercellular spaces with the net system called "Hartig's net" (Figure 3) (Srivastava et al., 1996; Sylvia, 2003).

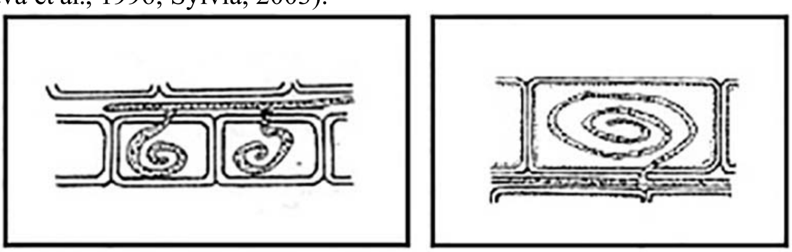

Figure 3. Arbutoid mycorrhiza penetrating into epidermal root cells (Srivastava et al., 1996).

Arbutoid mycorrhiza is found in Ericaceae genus members *Arbutus*, *Arctostaphylos, Gaultheria, Leucothoe* and *Vaccinium*, and in a few *Pyrolaceae* genus taxa (Sylvia, 2003; Smith and Read, 1997; Largent et al., 1980).

1.4. Monotropoid Mycorrhiza

Monotropoid mycorrhiza is found in the roots of plants with chlorophyll deficiency in *Monotropaceae* genus. It has the mantle overlay and creates a network system in intercellular spaces. They extend into the cells in the form of tiny protrusions (Figure 4) (Srivastava et al., 1996; Sylvia, 2003).

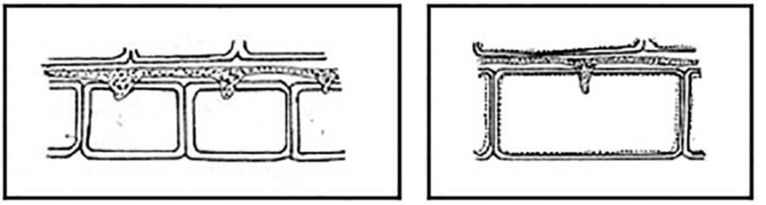

Figure 4. Monotropoid mycorrhiza that extends into root cells (Srivastava et al., 1996).

1.5. Ericoid Mycorrhiza:

These penetrate into epidermal and cortical cells. They branch out and curve within cells to occupy the cell (Figure 5) (Englander, 1984; Read, 1992; Read, 1996). They extend into intercellular spaces with the network system called "Hartig's net." The roots are covered with wooly, weak and dark brown hypha (Srivastava et al., 1996).

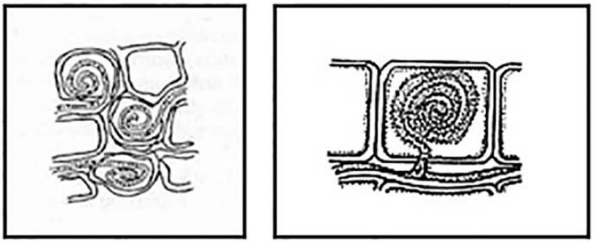

Figure 5. Ericoid mycorrhiza that fills the root cells by spiralling (Srivastava et al., 1996).

Ericoid mycorrhizae are formed in hairy roots of the plants that belong to *Ericaceae*, *Epacridaceae* and *Empetraceae* genus (Read, 1996; Smith and Read, 1997). They are found specifically in *Calluna*, *Rhododendron* and *Vaccinum* from *Ericaceae* genus (Malloch et al., 1980; Sylvia, 2003; Smith and Read, 1997).

1.6. Orchidoid Mycorrhiza

Orchidoid mycorrhizae are found in the roots of the plants that belong to *Orchidaceae* genus. They penetrate into the plant root cortical cells and develop by spiraling (Figure 6) (Srivastava et al., 1996; Smith and Read, 1997; Sylvia, 2003).

1.7. Endomycorrhiza

Endomycorrhiza extends and penetrates into root cortical cells. They create little tree-like branching arbuscular structures within cells (Figure 7) (Bonfante-Fasolo 1984; Dodd, 2000).

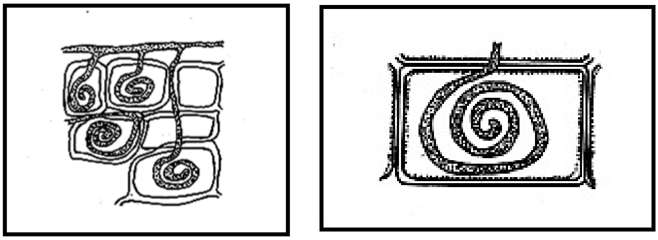

Figure 6. Orchidoid mycorrhiza that spirals in cortical root cells (Srivastava et al., 1996).

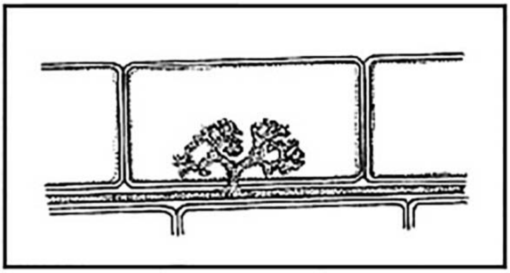

Figure 7. Arbuscular structure formed within root cells (Srivastava et al., 1996).

Furthermore, endomycorrhiza form oval structures called "vesicles" both in intercellular spaces and within the cells that are used to store the nutrients received from the soil (Biermann and Linderman, 1983; Marschner, 1995; Dodd, 2000).

Vesicles are dark colored and store phosphate granules and fats to be consumed by the plants during phosphorus deficiency (Srivastava et al., 1996). Arbuscular structures on the other hand, collect soil minerals such as P, Mg and Fe and transfer these to the plant (Davies, 2000). Egg-like, globular spores form outside the root and expand by branching (Bonfante-Fasolo 1984). A view of the spores, arbuscular and vesicular structures in the root cell are displayed in Figure 8. Endomycorrhiza is characterized by arbuscular formations and also called arbuscular mycorrhiza.

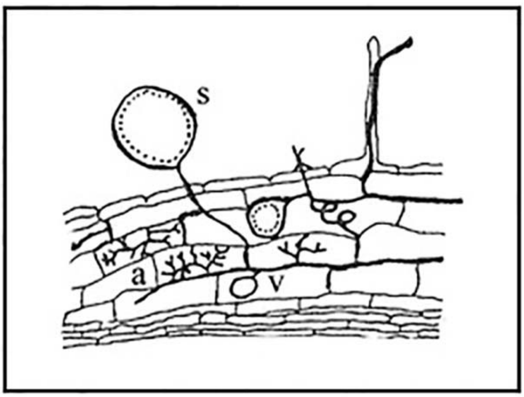

Figure 8. Endomycorrhizal spore (s), vesicular (v) and arbuscular (a) formations in plant root (Srivastava et al., 1996).

Certain endomycorrhizae forms between the root cells and within the root cells both in arbuscular and vesicular formations. As a result of these characteristic formations, they are alternatively named as Vesicular-Arbuscular Mycorrhiza (VAM) (Douds and Millner, 1999; Davies, 2000; Quilambo, 2003).

Vesicular-arbuscular mycorrhiza could penetrate the plant root in more than one way with the help of hypha they produce. They cross the intercellular spaces on the outer layer of the root and penetrate the cells or they could also expand by penetrating outer cells of capillary roots or older cells directly (Bonfante-Fasolo 1984).

In 1905, Gallaud classified vesicular-arbuscular mycorrhiza in two structural groups: Arum type and Paris type. Arum type mycorrhiza hypha develops between root cortex cells and penetrates the cells to form a branched structure. In Paris type, mycorrhiza hypha develops between root cortex cells and by spiraling from one cell to another and within the cell (Figure 9) (Smith and Smith, 1997). In a study by Brundrett and Kendrick (1990), it was evidenced that intercellular expansion and intracellular development of Paris type was slower than Arum type.

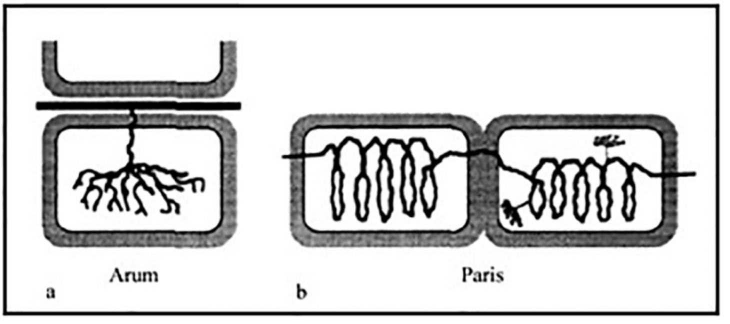

Figure 9. Arum (a) and Paris (b) type vesicular-arbuscular mycorrhiza (Smith and Smith, 1996).

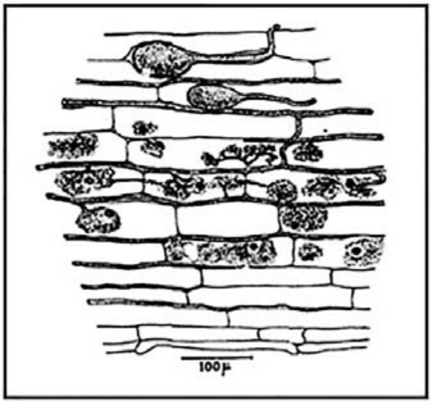

Figure 10. Arum-type formed in *Allium sphaerocephalu* plant root cells (Smith and Smith, 1997).

Gallaud demonstrated the structure of Arum type vesicular-arbuscular mycorrhiza that penetrated the root cells of *Allium sphaerocephalu* plant as shown in Figure 10; and the structure of Paris type that penetrated the root cells of *Anemone nemorosa* plant as shown in Figure 11.

The roots of more than 80% of the plants are formed by endomycorrhiza (Smith and Read, 1997; Davies, 2000). They are extensively found in the roots of angiosperms, gymnosperms and pteridophytes. Furthermore, it was reported that they also form in certain moss species (Mosse et al., 1981; Pocock and Duckett, 1985).

Recently, vesicular-arbuscular mycorrhiza was reported in certain wetland plants, even in some aqueous plants (Helgason and Fitter, 2009).

The most prevalent mycorrhiza in nature is the endomycorrhiza known as vasicular-arbuscular mycorrhiza (VAM) (Harley, 1989; Powell and Bagyaraj, 1984; Bonfante-Fasolo 1984). It was estimated that it is endemic to 85-90% of all angiosperms. It is found expecially in the roots of flowering plants (Harley and Harley, 1987; Mukerji et al., 2000).

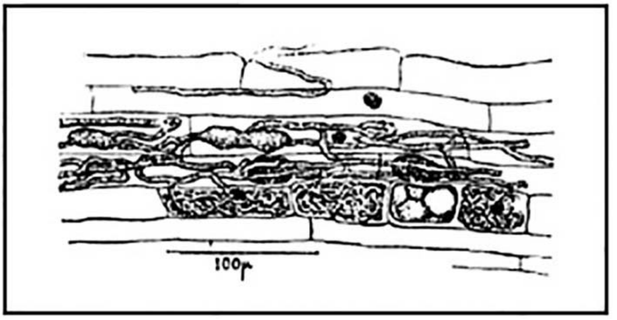

Figure 11. Paris-type formed in *Anemone nemorosa* plant root cells (Smith and Smith, 1997).

Although vesicular-arbuscular mycorrhiza exists in most plant genera, it is found very rarely (in habitats with stressed conditions) or never at all in genera such as *Cruciferae*, *Chenopodiaceae*, *Caryophyllaceae*, *Polygonaceae* and *Cyperaceae* (Powell and Bagyaraj, 1984; Neeraj et al., 1991; Francis and Read, 1994).

Other microorganisms do not create visually observable root transformations in the plants they exist, contrary to the anatomical changes VAM causes. The indicator of characteristic effects of VAM fungi on plant roots is the transformation and differentiation of the dimensions, morphology and capillary roots. Mycorrhizal plants are the ones with dense capillary roots and a fine root system and those are dependent on mycorrhiza (Bonfante-Fasolo 1984).

Arbuscular mycorrhiza could be infected by plant roots, hypha extending from other plant roots or spores in the soil (Marschner, 1995). Furthermore, large mycorrhiza spores in the soil could be distributed with the wind and water and could penetrate plant roots (Hetrick, 1984; Smith and Read 1997). At the same time, they could be transported to different regions in the stomach of several birds and mammals (Hetrick, 1984; Reddell and Spain, 1991; McGee and Baczocha, 1994).

Vesicular-arbuscular mycorrhiza has a great potential to promote plant growth and soil quality (Abbott and Gazey, 1994). Meanwhile, soil type and depth, seasons and vegetation affect the development of vesicular-arbuscular mycorrhiza. The impact of mycorrhiza generally depends on the density of mycorrhiza formation. Sudden environmental changes such as erosion and structural changes in the soil could result in significant reduction in mycorrhiza density (Abbott and Robson, 1991).

Density of the mycorrhiza spores in the soil is higher in areas around the plant roots. However, as their distance to the roots increase, the number of mycorrhiza spores tend to decrease (Jakobsen et al., 1992). Tommerup and Abbort (1981) reported that upon the death of the plant arbuscular mycorrhiza symbiosis could develop for a certain time period more.

2. ENVIRONMENTAL FACTORS THAT EFFECT MYCORRHIZAL FORMATION AND DEVELOPMENT

Formation and continued development of vesicular-arbuscular mycorrhiza on plant roots and in the soil are dependent on certain physical and chemical factors.

2.1. Physical Factors

1. Temperature: Similar to several other organisms, VAM is also affected by the temperatures. Usually under high temperatures, the success of mycorrhiza and spore formation in the plant root and the soil increases (Hetrick, 1984, Menge, 1984). Tibet and Cairney (2007) stated that the temperatures should be between 10/12ºC and 20/25ºC for mycorrhizal development and VAM activity is reduced considerably under

lower temperatures. Furthermore, the survival of mycorrhiza spores in the soil following the harvest or death of the plant is dependent on the soil temperature (Srivastava et al., 1996).

2. Light: Light factor is significant for VAM formation. For VAM to obtain the carbon necessary for its development, photosynthesis capacity of the plant that the roots of which it inhibits is quite significant. This indicates that light factor affects the root VAM development. Under low light conditions, root carbohydrate levels are reduced, hindering the development of VAM that feeds on carbohydrates. Several studies demonstrated that high light factor increased VAM percentage in the roots, while low light factor decreased VAM development (Tester et al., 1986; Son and Smith, 1988; Miller and Kling, 2000; Vierheilig et al., 2002).

3. Water: In arid lands and low yield soil, spore amounts and mycorrhiza infection are at a maximum (Hetrick, 1984). Under these stressed conditions, while the abilities of the plants to obtain water and nutrients from the soil are limited, mycorrhiza continues its growth, contributing significantly to plant growth.

2.2. Chemical Factors

1. pH: Although it is known that VAM significantly affects spore production and maintenance of its development, it is rather difficult to determine the effect of soil pH value on formation of the mycorrhiza (Hetrick, 1984; Wang et al., 1993). Several VAM types were identified to grow in different soil pH values. For instance, *Glomus mosseae* and many other Glomus taxa prefer soil with a pH value of 5 or higher, while it was determined that *Acaulospora* species develop better in soil with a pH value of below 5 (Menge, 1984).

2. Salinity: Several studies determined that mycorrhiza could maintain its natural development in saline soil as well (Carvalho et al., 2001; Hildebrandt et al., 2001; Sengupta and Chaudhuri, 2002). Although mycorrhiza formation is negatively affected as salinity increases, studies reported that mycorrhiza increased the salinity tolerance of the plants that are under salt stress and played a significant role in their growth (Juniper and Abbot, 1993; McMillen et al., 1998; Al-Karaki et al., 2001; Giri et al., 2003; Giri and Mukerji, 2004; Giri et al., 2007). It is considered that the assistance mycorrhiza provides for the plant to receive phosphorus and other elements from the soil is the real factor in the resistance of mycorrhizal plants against salinity (Asghari, 2004). Tolerance against salt stress is preferable in plants that could be used in coastal park designs.

3. Soil Chemical Content: Certain studies reported that high phosphorus levels in the soil causes a significant reduction in mycorrhiza formation (Gianinazzi-Pearson and Gianinazzi, 1983; Abbott and Robson, 1984; Cooper, 1984; Hetrick, 1984). Since nutrient intake by mycorrhizal plants is related to mycorrhizal development, this affects the receipt of nutrients as well (Liu et al., 2000). As a result, plant growth is negatively affected and limited.

3. SIGNIFICANCE OF MYCORRHIZA IN LANDSCAPE ARCHITECTURE

Especially in rural-arid areas with harsh ecological conditions, botanical material to be used in comprehensive planting applications in landscape architecture, ecological conditions and poor maintenance could aggravate the economic losses. Furthermore, draught conditions during the summer period become an important problem. As a result, plant growth slows down, nutritional relationships are affected negatively, plants remain weak, lack the desired effect ad in certain cases, plants even lose their lives. To reduce or wipe off these negative outcomes, plants should regularly and sufficiently be watered and fertilized.

Primary threats against the world today are led by global warming and climate change. The increasing intensity of greenhouse gases in the atmosphere, primarily CO_2 (carbon dioxide) as a result of human activities destroy the natural balance of the climate system, creating a global scale climate change problem. Along with global warming aridity increased, and intensity, frequency or the duration of precipitation started to change.

Global warming has various effects on human life and the environment. Especially summer temperatures started to increase considerably. Environmental factors such as increase in temperatures and decrease in precipitation cause reduction in water resources. As a result, water problem and aridity becomes prevalent. This significantly affects urban water consumers and endangers green areas. As the temperatures increase, plants start to lose more water via evaporation and irrigation water demand increases further as a result.

In landscape architecture planting practices, continuous irrigation and fertilization are required for the survival and maintenance of plants. This causes great economic burden on the operations. Furthermore, fertilizer application destroys the natural balance of the soil. Lack of these applications or ineffective application harm the plants, their growth is interrupted, and could even result in their death. Thus, they lose their effects within the design.

In fields where soil moisture is low, VAM increases the tolerance of the plant against aridity. Thanks to its rootlets that spread in the soil, VAM could bring in the water located far away to the plant (Cooper, 1984).

Mycorrhiza raises the tolerance of the plant against environmental conditions and water stress. It promotes healthy growth of the plant with minimum stress. It promotes the survival of the plants by increasing their tolerance against aridity and nutritional deficiency (Morte et al. 2000, Var et al., 2011, Pulatkan 2010). Mycorrhiza also plays significant roles in sustenance of biological structure of the soil, increasing its yield and treatment of root diseases (Torres-Barragan et al., 1996; Matsubara et al., 2000b; Matsubara et al., 2001). Furthermore, it improves the resistance of the plant against pathogens, and protects the plant against heavy metals and other toxic elements. In addition, it increases the resistance of the plant against water and salt stresses (Bagyaraj, 1984; Azcon-Aquilar and Barea, 1996; Smith and Read, 1997, Giri et al. 2007). Water spray is an important problem for planting in coastal areas. Due to the negative factors in such fields, plants that could be used to satisfy the expectations are quite limited. It is required to use salt stress resistant plants. Plants that are planned to be used to create an aesthetical and functional effect in coastal areas could be hardened with mycorrhiza for full effect.

Visual quality and aesthetic value of a plant with a rich and alive foliage and flower mass increase. This is a welcome quality for plants that would be used in planting designs. Especially in planting work that would be conducted in low maintenance arid areas with limited water supply, mycorrhiza inoculated plants would form a good structure, creating the desired effect. Studies conducted on certain plants used in planting designs in landscape architecture determined that mycorrhiza increased the size of the plant and number of suckers, promoting a dense foliage growth (Maya and Matsubara 2013, Perner et al, 2007, Sanchez-Blanco et al. 2004, Koide and Li, 1989, Sanon et al. 2005, Pulatkan et al. 2010). Furthermore, mycorrhiza is effective on flowering of the plants (Calvet et al. 2001). Lu and Koide (1994) reported that plants, which were colonized with mycorrhiza, flowered more and as a result fruit formation has increased as well. Mycorrhiza, by promoting root conductivity for water flow, increases root water intake. In addition, it promotes more capillary root formation in plant root structure and results in changes in root morphology due to increased branching and root lengths (Davies et al. 1996; Smith and Read, 1997). Movement capacities of P and other nutritional elements are quite low in arid soil. Mycorrhiza facilitates water and nutritional element intake, especially the phosphorus (P) that is necessary for plant growth. As nutritional stress is lowered, root development is improved and water intake from the soil becomes more effective (Fitter, 1985; Smith and Read, 1997). In certain studies on aesthetic plants in the literature, it was identified that mycorrhiza increased root development (Maya and Matsubara, 2013, Estaun et al., 1997, Hashem, 1995, Pulatkan, 2010).

Mycorrhiza provides nutritional elements for the plants, promoting plant growth. It was reported that there are 3 important reasons for mycorrhizal plants receive more mineral nutrients from the soil when compared to non-mycorrhizal plants. First, mycorrhiza increases nutritional intake by reducing the distance between the nutrients and plant roots. Second, mycorrhizal roots are more successful in the relationship between nutrients obtained from the soil and nutritional concentrations absorbed from the surface when compared to the roots of non-mycorrhizal plants. And finally, mycorrhiza facilitated absorption of nutrients by the plants by changing the nutrients chemically (Abbott and Robson, 1984).

Phosphorus is the mineral nutrient that could be absorbed from the soil by the plants the least (Marschner, 1986). Primary function of vesicular-arbuscular mycorrhiza is to increase the intake of stationary soil nutrients, and especially phosphorus and to render it ready to use for plants (Bolan, 1991; Johansen et al., 1993; Smith and Read, 1997). While mycorrhiza assists the plant in absorption of phosphorus and less movable nutrients existing in the soil, it absorbs carbohydrates from the plant (Newman and Davies, 1987; Harley, 1989; Smith and Read, 1997; Helgason and Fitter, 2009).

The function of vesicular-arbuscular mycorrhiza in low-nutrient content soil is quite important. In soil with limited P content, mycorrhiza inoculated plants could receive more P compared to non-mycorrhizal plants and exhibit better growth (Bolan, 1987). Mycorrhiza infection increases root surface and thus, enables the plant to reach stationary nutrients around the root such as Cu, Fe, Mn and Zn, which the plant could absorb only in limited amounts (Faber et al., 1990; Bolan, 1991; Kothari, 1991; Lampert and Weidensaul, 1991; Li et al., 1991; Bürkert and Robson, 1994).

Despite its success in providing the plant with nutrients such as P, Cu and Zn, the contribution of vesicular-arbuscular mycorrhiza in N intake by the plant is quite low (Marschner et al., 1991; Smith and Read, 1997). However, certain studies reported that mycorrhiza increased N intake capacity of the plants exposed to drought stress and also provided N transactions between plants (Ames et al., 1983; Johansen et al., 1993; Subramanian and Charest, 1999).

Dell Amico et al. (2002) reported that better growing plants with additional P intake provided by mycorrhiza had larger leaf surfaces when compared to non-mycorrhizal plants. Since the increase in leaf surface promotes photosynthesis, plant carbon content rises significantly and more carbon is stored in plant roots. Thus, the development of mycorrhiza that survives with the carbon it receives from plant roots is improved as well (Gianinazzi-Pearson and Gianinazzi, 1983; Thomson et al., 1986). Jacobsen and Rosendahl (1990) and Tinker et al. (1994) stated that mycorrhiza utilizes about 5-20% of the product obtained by plant photosynthesis.

The present study aimed to exhibit the effects of mycorrhiza on plants against the problems that could arise in problematic areas where plating would could be conducted in landscape planning projects. It was stressed that maintenance and irrigation expenses could be reduced during planting stage and the years that follow planting especially in applications in arid areas and sustainability of the plantings could be maintained by using mycorrhizal saplings. Mycorrhiza could promote better and rapid adaptation of plants in the soil they were planted and increase the visual and functional value of botanical designs in landscape architecture.

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Chapter 14

Evaluation of Spatial Permeability Concepts: A Case Study of the Trabzon Forum Shopping Centre

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INTRODUCTION

Research in the literature has suggested that permeability can be defined by the determinants of a successful space, including the physical, functional and perceptual properties as well as the associated concepts of accessibility, diversity and legibility. Moreover, spaces possessing a high level of permeability are preferred by the people who use them. The recent growth in the number of shopping malls in the world has highlighted the burgeoning consumer demand for the comfort and convenience of shopping centers. Even if a changing consumer profile with new demands and patterns of behaviors and particularly rapid increases in access to shopping centers, the hierarchy remains the focus (Guy, 2007, Findlay, & Sparks, 2013) Nonetheless, the attraction of shopping centers is undeniable. As people move from traditional to modern lifestyles, their understanding of consumerism and shopping changes. A gradual increase in daily life choices has also expanded modern conceptions of what constitutes a necessity (Özcan, 2007), and these changing notions have affected personal habits. On the other hand, urban living and technological developments have occasioned the development of various solutions for meeting demands for those emerging necessities. Accordingly, research into types and qualities of space as a necessity is ongoing.

Since the 1960s, the phenomena of rapid urban growth, unprecedented prosperity, and increasing ownership of private cars have produced an interwoven set of urban problems that many countries of the world, including Turkey, have had to address. One dimension of the urban problem is the decline in the economic, social, and environmental attractiveness of downtown city centers as ever increasing numbers of motor vehicles jostle for space and pollutes the air (Hajdu, 1988). At the same time, the establishment of large out-of-town shopping centers gives urban residents an alternative to shopping in the city centre (Hajdu, 1988). According to Lewis, shopping centers are multifunctional environments which provide retail, recreational and community facilities. As much as 10% of the floor space of many shopping developments is now being given over to leisure activities. The shopping centre is having an impact not only on the physical environment, but also on our social lives and our social and psychological relationships with the place (Uzzel, 1995). Moreover, shopping centers have captured the interest of corporate investors. Following the collapse of the market for office space, they have found an attractive investment opportunity in shopping centers (Goossens, Guinée, & Oosterhoff, 1995). Initially,

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Turkey joined this process in 1989 with the opening of Galeria Shopping center. Now the shopping center number is 299 and it is expected to increase in time.

Figure 1. The distribution of shopping centers in Turkey by cities, AYD (2016).

These changes have resulted in long-term detrimental effects on the appearance and viability of urban city centers. Those effects were first recognized in Western Europe, but now cities around the world are concerned with them (Hajdu, 1988). Besides, concerns allowing modern retailing to out-compete existing retailing in existing locations, runs the risk of damaging social cohesion and the ability of particular consumer groups to access suitable shopping facilities (Guy 2007).City authorities in countries as diverse as Japan, Brazil, and Australia are undertaking measures to counteract city centre decline. In the United States, experts such as Jacobs (1961), Appleyard & Lintell (1972) and Rubenstein (1978, 1992) have taken up this issue. The maintenance of the economic viability of urban centers as well as the restoration of their ‘urbanity’, ‘environmental appeal’, and ‘visual stimulation’ are seen as vital concerns (Hajdu, 1988).

Montgomery (l998) defines successful spaces as the urban places offering multiple services and attractions and which are reachable in less than ten minutes on foot. Behavioral research has shown that the use density of spaces may be differentiated, with more densely used spaces being evaluated as more successful. This success is not always in a positive sense, as in the case of airports, for example, where there is necessary density of use, but not necessarily a positive choice or preference of the users. The criteria discerned for such spaces gives rise to an assessment of the attributes of quality spaces. Using design approaches that have been improved based on such experiments, it is possible to create more convenient, lively and livable environments of better quality. Cullen (1961) defines an area as lively and interesting according to its location in the urban wholeness.

One of the important urban design qualities established by the cadastral pattern is that of 'permeability' - meaning the extent to which an environment allows a choice of routes both through and within it. It is also a measure of the opportunity for movement (Carmona, Heath, Oc & Tiesdell, 2003). Many researchers have emphasized in their theoretical studies that the permeability concept is an important criterion in developing sustainable planning strategies and creating quality spaces (Abedi, Moshaver & Madadi, 2015; Carmona et al., 2003; Punter & Carmona, 1997; Bentley, Alcock, Murrain, McGlynn & Smith, 1985; Zarei, Ahani & Dizaji, 2013). Some researchers suggest that users prefer and feel more positively towards spaces with high levels of permeability.

Since permeability directly concerns space and its uses, it has become a widely studied and discussed design concept among researchers (Table 1). In many theoretical studies, it has been emphasized that the permeability concept is an important criterion in creating planning strategies and quality spaces (Carmona et al., 2003, Punter & Carmona, 1997, Bentley et al., 1985). However, in some cases, permeability loses its distinction of being a successful space determinant. Again, the example of airports can be cited. Although they are permeable and used by many people, they cannot be considered to be very successful as positive and desirable venues.

Table 1. Effective components, factors and indicators of environmental quality from the view of scholars

THEORISTS	ENVIRONMENTAL QUALITY COMPONENTS
Jane Jacobs, 1961	Appropriate activities, visual regulation of environment, mixed use, attention to the street, being permeable and flexible incorporation of social mix and flexibility of spaces
McGlynn, Smith, Alcock, Murrain & Bentley , 1985	Permeability, variety, legibility, robustness, visual appropriateness, richness, personalization
Bentley, 1990	Energy efficiency, variety, permeability , legibility, resilience, cleanliness, vitality
Jacobs & Appleyard, 1987	Access to opportunities, imagination and joy , vitality, identity and control, authenticity and meaning, community and public life, inclusive environment, urban self-reliance
Francis Tibbalds,1988, 1992	Mixed-use, flexibility, growth and gradual changes, attention to pedestrians, legibility, flexible and adaptable environment, attention to the locations of buildings, learning from the past and present, respect for place, human scale, pedestrian safety climate performance, discipline, identity, charm, climatic comfort
Brian Goodey, 1993	Vitality, harmony and compatibility with the existing context, diversity, human scale, permeability, personalization, flexibility, enabling the development of a deliberate and controlled change, enrichment
Graham Haughton & Colin Hunter, 1994	• Variety - multifunctional districts with varied building styles, ages and conditions • Concentration - sufficient density to maintain variety and activity including people who are resident • Democracy - offering choice of where activities are conducted • Permeability - connecting people with each other and to facilities • Security - through the design of spaces to enhance personal safety • Appropriate scale - developments building on local context and reflecting local conditions • Organic design – respecting historic narrative and local distinctiveness • Economy of means – designing with nature and using local resources • Creative relationships – between buildings, route ways and open spaces • Flexibility - adaptability over time • Consultation - to meet local needs, respect traditions and tap

	resources • Participation - in the design, maintenance and running of projects
McGlynn & Murrain, 1994	Permeability, variety (vitality, proximity and concentration), legibility, and robustness (resilience).
Punter & Carmona, 1997	Using neighborhood land, pedestrian movements, behavioral patterns riders' movement, permeability.
Urbed, 1997	• Quality space - attractive, human and urban • A framework of streets and squares - well-observed routes,spaces • A rich mix of uses and tenures • A critical mass of activity – to sustain facilities and animate the streets • Minimal environmental harm -during development and in the ability to adapt and change over time • Integration and permeability • A sense of place mixing new with old • A feeling of stewardship and responsibility
Evans et al., 2001	• Freedom from pollution - minimizing waste • Biotic support - by maintaining biodiversity • Resource conservation - air, water, topsoil, minerals and energy • Resilience - a long life for development • Permeability - providing a choice of routes • Vitality - making places as safe as possible • Variety - providing a choice of uses • Legibility - enabling people to understand the layout and activities of a place • Distinctiveness - in landscape and culture

Among the urban space qualities, permeability is not usually considered to be a very preferred concept for the interior of closed shopping centers, although it is seen as an important indicator of successful spaces and increases the attraction potential of shopping centers as well. However, measures such as the instalment of one-way revolving entrance doors and vertical circulation systems (escalators/moving stairs) are taken in some shopping malls so as to reduce the permeability. The route of the users is deliberately extended for the purpose of commercial concerns, and they are obliged to take a longer and indirect way to reach their destination. In this way, the potential of shopping probability is increased and even encouraged as the user passes the window displays and showcases. Since an entrance gate is mandatory in some shopping centers, one must wander around the entire space before being able to exit.

By considering permeability in terms of physical dimensions and setting forth its relation to enclosure, Stamps (2003) studied the interrelation of permeability, the horizontal dimensions of rooms and wall height, and found that the less enclosed an area is, the more permeable it is, and that a negative relationship exists between enclosure and permeability. Stamps (2005) later examined physical and visual permeability to ascertain the relationship between enclosure and security, and found that visual and physical permeability affect the extent to which users feel enclosed, surrounded or secure. In yet another study, Stamps (2010) offered a theory of permeability which held that it is important that people have open spaces in which they can see objects and movement.

Looking at permeability in its own right, Oluseyi (2006) determined the physical proportions of every section of Johannesburg and constructed a map using the technique of spatial and social connection mapping. He examined permeability in terms of the ratio of roads continuing without interruption (i.e., permeably), to the length or potential communication distance of all the roads in that region and found that the higher a region's permeability level in terms of these physical dimensions, the higher will be its levels of social interaction.

Another study (Mehta, 2006) showed that livelier districts have substantial permeability and that people tend not to use districts in which they have nothing to do or see in their surroundings, and that they do not participate in activities in those districts. By examining the relationship between visual permeability or transparency and the use of space, the study indicated that districts without dead spaces were more frequently used.

While the physical dimension of permeability is associated with comfortable and convenient transportation to destinations, its perceptual measurement can be associated with the legibility, perceptibility and retained images of the space in the urban area. In addition, the other aspect of permeability that has so far been neglected is the functional value of a location to be reached by the user and the possibility of a path leading to that place. The existence of more than one option to arrive at point B from point A does not mean that permeability levels of these options are the same. Permeability of a building, place or space, therefore, is also associated with the optional and social activities it provides in addition to the essential ones.

Gehl evaluated the activities held in public spaces in terms of three groups. These are essential activities such as going to work and school, optional activities such as walking, wandering and sitting outside and social events such as talking to people, greeting and seeing other people (Carmona & Tiesdell, 2007). In the present study, the evaluations were carried out on the permeability of the venues preferred for optional and social activities only, not for the necessary ones. Therefore, the potentials of attraction were investigated using the example of the Forum Shopping Centre. These included functional properties, physical properties and the remaining experimental impressions of perceptual properties of the space.

The wider scope of physical properties represent the typology of space, space size, closures, boundary characteristics, climate, ground floor uses, landscape elements, material diversity, vitality and quality, whereas functional characteristics represent diversity, vitality, social and cultural activities and economic structure. Finally, the perceptual or sensory properties include visual quality, cognition, authenticity, comfort, safety, experiences and points of emphasis (Yavuz, 2009). For this study, the concepts explaining physical, functional and perceptual properties have been applied in a simplified way.

Permeability

Bentley has defined permeability as 'a distance that a neighborhood provides people as a choice of access to pass through from a place to another one' (Bentley et al., 1985; Bentley, Alcock, Murrain, McGlynn, & Smith, 1993; Bentley & Watson, 2007). Evans defines permeability, to which he has given a place among his sustainable planning strategies, as 'a choice of road, in other words providing an opportunity to choose one of the roads or be able to make a choice' (Carmona, 2003). Montgomery

(1995) defines permeability as 'the capacity of getting into an area and moving around there easily'. According to Lennard & Lennard (1987), 'permeability is one of the four attributes comprised of legibility, variety and sensibility and takes place among the criteria that urban authorities require'. According to Stamps (2003), permeability is 'the movability of something in another one'. All these definitions, at the same time, denote the subsets of permeability. This study suggests that the concept of permeability cannot be evaluated based on physical attributes alone; it is also essential to examine functional and perceptual properties in order to be able to say that a space has the quality of permeability.

The permeability concept in this study is interpreted as a factor that increases the quality of outdoor and indoor spaces. Although permeability has frequently been examined in relation to urban outdoor spaces, a review of the literature on the less frequently researched permeability of interior spaces (Wapner, Demick, Yamamota & Takahashi, 1997; Rengel, 2014; Markus, 1993) reveals that the concept of permeability in this context has been characterized in terms of such sub-concepts as plurality, variety, accessibility, legibility, visibility and integration. The concept of spatial permeability in the enclosed shopping centre as a public space and the factors supporting it were examined in this study.

The permeability model, scope of the research and hypotheses

Permeability is among the required attributes for successful spaces given that users prefer permeable spaces or districts and use them more frequently. Meanwhile, the properties that make places more preferable and useable are in harmony with the attributes of permeability.

All definitions and research regarding quality of spaces support the assumption that permeability and its interrelated concepts are connected to the 'physical, functional and perceptive future' of spaces. Permeability can be evaluated in terms of physical, functional and perceptive properties given the connections between easy accessibility and physical properties, variety and functional properties, and legibility and perceptive properties. Table 2 presents a permeability model in accordance with these properties that was developed in a study of pedestrian shopping streets (Yavuz, 2009).

Table 2. Permeability model for a pedestrian shopping street (Yavuz, 2009, Yavuz & Acar,2016)

PERMEABILITY		
Physical Properties	**Functional Properties**	**Perceptual Properties**
▼	▼	▼
Accessibility	**Variety**	**Legibility**

That study (Yavuz, 2009) of pedestrian shopping streets verified the assumption framework shown in Table 1 and established a basis for the permeability research that is the focus of this study carried out in the Trabzon Forum Shopping Centre. Pedestrian streets accommodating the concepts of accessibility, variety and legibility possess the quality of permeability. The assumption has been examined and verified that the presence of permeability based on these attributes positively affects the use of space in terms of shopping patterns in the context of a pedestrian street (Yavuz, 2009).

This study examined whether a similar permeability assessment using the same sub-concepts could also explain user behavior in a shopping centre, based on the consideration that in connection with physical, functional and perceptive properties, the concepts of accessibility, variety and legibility are also determinants of shopping centre permeability. The present study pursued this question in the context of the Trabzon Forum Shopping Centre. Sub-concepts connected with the physical, functional and perceptive properties underlying the permeability of pedestrian shopping streets were established via previous research as set out in Table 3.

Table 3. Descriptors of pedestrian shopping street permeability in order of priority

Physical Properties: Accessibility	**Functional Properties: Variety**	**Perceptive Properties: Legibility**
		Familiar
	Functional	
		Inviting
Fluent		
		Pleasing
	Convenient	
Open		
	Entertaining	
		Peaceful

Thus, the accepted assumptions of this study were that the concept of permeability can be explained using the sub-concepts of accessibility, variety and legibility regardless of the type of space, and that the presence of permeability positively affects the use of the space.

MATERIALS AND METHODS

Study Area: Three shopping centers are located in the city of Trabzon in the Eastern Black Sea region of Turkey: the Forum, the Varlıbaş and the Cevahir. These shopping centers are within a 15-minute drive of each other (Fig. 2). Varlıbaş Shopping Centre has not yet achieved the expected power of attraction, although it is very close to the municipal governorate complex and is in a densely populated housing development. The Cevahir Shopping Centre has serious deficiencies, especially in terms of physical and functional dimensions, and has gradually lost its power of competitiveness as a space in the city. The Forum Shopping Centre has comparatively more young users due to its close proximity to the university. Students can easily go to the Forum Shopping Centre at noon or in their spare time for a meal or other activities. Being comparatively different in terms of the possibilities it provides, the Forum Shopping Centre is a space frequently preferred by both youth and the adults. The major brand shops, previously located only in the main pedestrian shopping streets and around the city square, have gradually been transferred to the Forum Shopping Centre. This move is considered to be associated with the changing consumer mentality as well as with the preference level of the Forum Shopping Centre (Fig. 3).

Figure 2. The location of the Trabzon Forum Shopping Centre along with the other shopping centers and the university (KAN,2016).

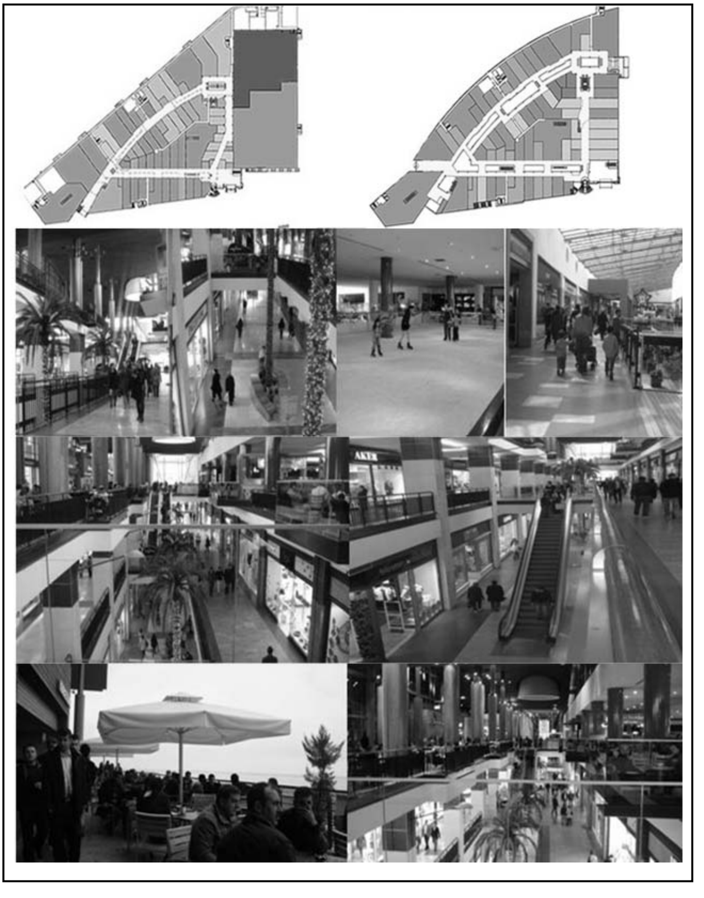

Figure 3. First- and second-floor plans of Forum Shopping Centre and interior views.

This study was conducted in the Trabzon Forum Shopping Centre, which has an area of approximately 72.000 m^2. The Trabzon Forum, chosen because it was Trabzon's first mega-scale shopping centre, is situated in the coastal area of the Kalkınma suburb, near Karadeniz Technical University and the century-old Atatürk Park. It is directly connected to the coastal state highway and urban roads, and is visually integrated with the sea. The Trabzon Forum Shopping Centre, which implements the street concept, has suddenly become a city attraction due to its construction markets, hypermarkets, cinema, cafés, restaurants and shops offering nationally and internationally famous brands. In short, the four-storey building has become the district's economic and social centre. Its enclosed and open parking areas are in heavy use every day of the week.

Method

The main purpose of this study, with the results will be revealed by this study is to find out the guiding characteristics in order to protect small retailers, ensure the efficiency of retailing, protect the culture in the shopping street, sustain the environmental quality and protect the vitality of urban centers.

In devising the survey method, several viewpoints were taken into account. Urban qualities such as permeability have particular resonance for the pedestrian. Insofar as these qualities reflect the shape of urban form, which is measurable, their physical expression may be evaluated and compared between areas of differing morphology. The space syntax method has enabled a comparative quantification of the urban design qualities of permeability and legibility for urban spaces (Osmond, 2005) and has been widely accepted as a useful tool for analyzing places (Carmona et al., .2003; Markus, 1993). In addition to space syntax, semantic differentiation is also used to evaluate the spatial permeability (Mahdavinejad & Abedi, 2012). On the other hand, Betchel, Marans and Michelson et al. have suggested that a variety of complementary methods should be used in studying relationships between environment and behavior (Bechtel & Zeisel, 1987, Ng, 2003). In compliance with this advice, this study applied a two-phased survey technique.

Survey questions were prepared based on instruments tested in previous research (Yavuz, 2009). The Trabzon Forum Shopping Centre was selected in order to evaluate the effects of its physical, functional and perceptual properties on users. This study solicited user views, criticisms and general opinions based on the significant relationship between user preferences and permeability. A total of 100 shopping centre users were surveyed to ascertain why, when and how often they used the shopping centre and to solicit their descriptions thereof.

The results of that survey were statistically analysed to yield pairs of adjective descriptors of the shopping centre, and these were employed in a second survey of 130 shopping centre users to ascertain the relationship of these descriptors with permeability, and to refine the definition of permeability in this context. This study was conducted with a total of 230 shopping centre users.

The semantic differentiation scale, a technique originally developed by Osgood et al. (1957), was used in this second phase of the survey study. The scale has a linguistic origin and consists of antonymous adjective pairs (Öztürk, 1978). In this phase, users marked each adjective describing the shopping centre and assigned it the value they considered appropriate on the following scale: +3, +2, +1, 0, -1, -2, -3. The adjective pairs thus analysed are displayed in Table 4 according to properties associated with the concept of permeability, the groups they represent, and their related concepts.

Table 4. Pairs of adjectives, groups represented and related concepts

PHYSICAL PROPERTIES Accessibility	**FUNCTIONAL PROPERTIES Variety**	**PERCEPTUAL PROPERTIES Legibility**
Narrow-Wide	Boring-Entertaining	Crowded-Calm
Short-Long	Inactive-Active	Dull –Lively
Closed-Open	Few opportunities-Lots of opportunities	Ordinary-Attractive
Congested-Fluent	Expensive-Inexpensive	Disturbing-Peaceful
	Few activities-Lots of activities	Uninviting-Inviting
	Inconvenient- Convenient	Strange-Familiar
	Non-functional-Functional	Displeasing-Pleasing
Not Permeable-Permeable	Not Permeable-Permeable	Not Permeable-Permeable

RESULTS AND DISCUSSION

First Survey Questionnaire: *Use Objectives, Definitions, Reasons for Preference, Preferred and Undesirable Aspects, Comparisons*

Of the 100 participants in the first survey, 57% were female and 43% were male; 62% were young (under 30), 22% were middle-aged (31-45) and 16% were older (46+). Participant responses as to their educational status revealed that 69% were university students, which was understandable considering the location. In future, studies could be conducted in a more homogeneous venue to avoid this type of bias. A total of 66% of participants expressed a preference for using the shopping centre on weekends. In terms of frequency of use, it emerged that 62% of participants reported using the centre once a week, while 42% reported using it primarily after 3:00 p.m. When asked about their reasons for using the shopping centre, 64% of participants reported using it for shopping, 43% for eating and drinking, 25% for meeting, 22% for going to the cinema and 20% for entertainment.

Participants were requested to priorities three properties of the shopping centre and results were as follows: providing variety 52%, being accessible 40%, and being familiar 2%. This evaluation is in parallel with the participants' reported reasons for using the shopping centre.

Table 5. User reasons for preferring the Forum Shopping Centre

User reasons for preferring the Forum Shopping Centre(%)		
Preferences due to perceptual properties	Preferences due to functional properties	Preferences due to physical properties
8	77	15

When asked how they would describe the Trabzon Forum Shopping Centre to a foreigner, 75% of participants answered 'long', 73% 'large' and 'convenient', 70% 'lively', 68% 'functional', 67% 'active', 66% 'inviting' and 65% 'fluent'. These and other descriptions with lower values are shown in Figure 4.

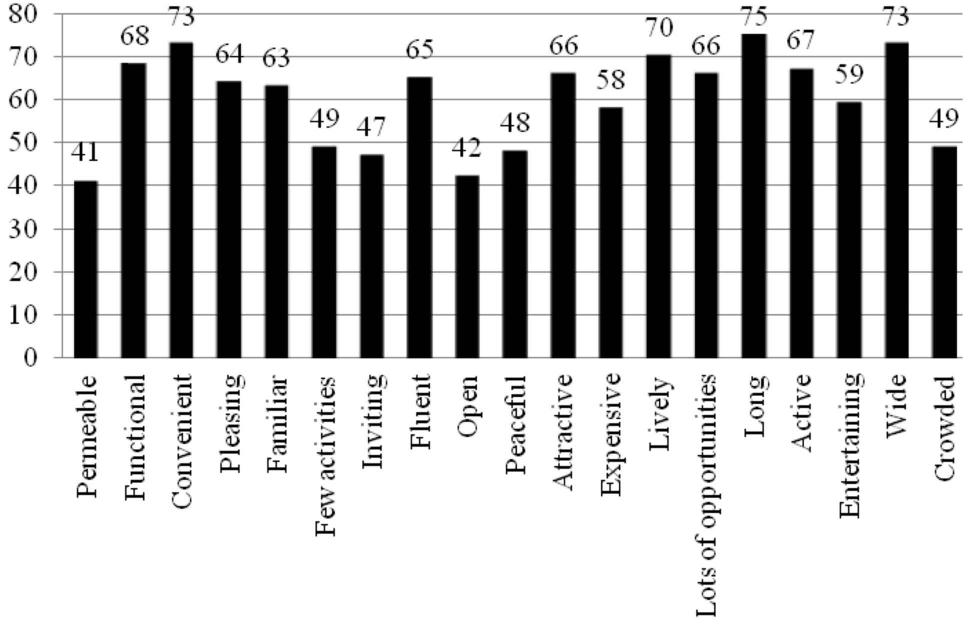

Figure 4. User descriptions of the Forum Shopping Centre

The descriptions of participants who emphasized being familiar with the shopping centre were clustered into three groups: 8% emphasized the centre's physical properties, 42% its functional properties and 50% its perceptual properties. 'Big', 'small', 'flat' and 'spacious' were mentioned in the physical descriptions group; 'convenient', 'boring', 'entertaining', 'expensive', 'lots of opportunities', 'lack of alternatives', 'living centre' and 'meeting point' emerged in the perceptual descriptions group; and 'crowded', 'ordinary', 'attractive', 'boring', 'lively', 'satisfying', 'interesting', 'charming', 'beautiful', 'complex' and 'modern' were given in the perceptual descriptions group (Table 6).

Table 6. User descriptions of perceptual, functional and physical properties

User descriptions of perceptual, functional and physical properties(%)		
Perceptual descriptions	Functional descriptions	Physical descriptions
50	42	8

When asked which aspects of the shopping centre they liked most, which ones they disliked most, and what changes they would suggest, participants once again responded in such a way as to suggest three groups, namely the physical, functional and perceptual, given that preferences and expectations contribute positively to permeability (Table 7).

The convenient location of the shopping centre emerged as the most liked physical feature at 12%. Other favored features were that the shopping centre is big and enclosed, and that it has terraces, moving stairs, a good location, and all the shops situated together. Liked features in the functional group were such qualities as being luxurious and entertaining, and having a variety of foods, a cinema, ample parking, and a good offering of choices. In the group of favored perceptual features, such attributes as peaceful, crowded, calm, attractive, lots of opportunities, warm, modern and providing a feeling of security were listed. Among the preferred functional properties, variety was the most frequently mentioned, at 44%. Other preferred properties mentioned included good parking, a cinema and cafeterias. Concerning the classification of the preferred perceptual properties, 3% of users indicated that they liked the space because it is peaceful, while others mentioned its being calm, secure, charming, active, warm, modern and attractive.

Table 7. Forum Shopping Centre user liked, disliked and suggested features

Forum Shopping Centre user liked, disliked and suggested features (%)			
	Perceptual properties	Functional properties	Physical properties
Suggested properties	4	29	46
Criticized properties	2	27	53
Favored properties	11	57	31

In terms of undesirable physical attributes, untidiness and insufficient stairs were most frequently mentioned at 25%. Expense was the most frequently listed disliked attribute at 9%, and noisiness was the most frequently mentioned undesirable perceptual attribute at 2%.

As to participant suggestions, having vertical circulation elements that are more interconnected and useful was the most frequently suggested physical attribute at 15%, increasing the number of amusement spaces was the most frequently suggested functional feature at 9%, and reducing noise was the most frequently suggested perceptual property at 4%.

The relationships among these answers were ascertained by means of a correlation test. Correlations significant at the level of 0.01 are marked with double asterisks [**] in Table 8. As that table shows, a positive relation emerged between the suggested attributes and the disliked ones.

Table 8. Correlations of undesirable features

VARIABLES	Definition	Attractive	Likes	**Dislikes**	**Suggestions**
Definition	1.000	-0.135	-0.083	0.013	0.013
Reason of preference	-0.135	1.000	0.024	-0.100	0.138
Likes	-0.083	0.024	1.000	0.097	0.137
Dislikes	0.013	-0.100	0.097	1.000	**0.282****
Suggestions	0.013	0.138	0.137	**0.282****	1.000

Participants, when requested to compare the Forum Shopping Centre with pedestrian shopping streets, described the Forum Shopping Centre as being more exclusive (15%), offering more opportunities (11%), having more controlled climatic conditions (12%), and as being more beautiful (7%) and modern (7%).

Second Survey: *Adjectives Defining Permeability*

In the second survey study, 130 participants were asked to evaluate the Forum Shopping Centre via a questionnaire which offered an adjective-pair semantic differentiation scale in order to ascertain the relationship between user descriptors of the shopping centre and the adjectives connected to permeability. Of the 130 participants in the second survey, 52% were female and 48% were male; 59% were young (under 30), 31% were middle-aged (31-45) and 10% were older (46+).

Participant responses as to their educational status revealed that 67% were university students, which was understandable considering the location. A correlation test was used to analyze the relationship between the dependent variable of permeability and the independent variables of the adjective pairs. Adjectives correlated at a significance level of 0.01 are marked with a double asterisk [**] in Table 10.

Based on these findings, the adjective pairs correlated with permeability were analysed via a regression test to discover which may be said to define permeability. The results of this analysis revealed that the permeability of the Forum Shopping Centre was positively correlated at a significance level of 0.01 with the following adjectives: convenient, functional, inviting, open, fluent, peaceful, crowded and pleasing (Table 10).These findings show that the shopping centre’s permeability was primarily correlated with these adjectives and imply that permeability values could increase in correlation with the increased variety of adjectives.

Permeability model for shopping centers

Those variables which best define permeability were then determined via regression analysis, which revealed three models defining permeability at a significance level of 0.01, as shown in Table 9. In light of the evaluation of the permeability power of the adjectives shown in Table 9, it was determined that the model that best defined permeability was that comprised of the adjectives *inviting*, *open*, *calm* and *convenient* (Model 4).

Table 9. Regression analysis of permeability definition

Variables	B	Beta	t	Sig.
	0.58		1.05	0.00
Inviting	0.26	0.22	2.49	0.00
Open	0.19	0.22	2.79	0.00
Calm	0.18	0.20	2.64	0.00
Convenient	0.22	0.22	2.56	0.00

n= 130; R = 0.55; $R^2 = 0.31$; $R^2adj = 0.28$; F = 13.768 (Sig.= 0.000)

With regard to these defining terms, it could be said that *inviting* and *calm* are associated with perceptual features, *open* with physical features and *convenient* with functional features and that all were statistically meaningful. The permeability model developed for indoor shopping centers can be seen in Table 11.

Concepts of shopping streets vs shopping centers

In terms of physical, functional and perceptual attributes, the findings revealed that the adjectives chosen by those surveyed were meaningfully related to the features of both types of spaces. Within the scope of the physical, functional and perceptual properties of pedestrian shopping streets, permeability may be defined as accessibility, variety and legibility (see Table 2). These same concepts may also be used to define permeability in the context of indoor shopping centers. However, the findings herein indicate that the sub-concepts describing them and their rank are different for indoor shopping centers. The sub-concepts of *fluent*, *functional* and *familiar* that are connected with pedestrian shopping streets (Table 3) give way to the sub-concepts of *open*, *convenient* and *inviting* for the indoor shopping centre (Table 11).

Table 10. Correlation of Forum Shopping Centre descriptors and permeability(** Meaningful correlations significant at the 0.01 level)

	Calm	Wide	Entertaining	Active	Long	Lots of opportunities	Lively	Inexpensive	Attractive	Peaceful	Open	Fluent	Inviting	Activity	Familiar	Pleasing	Convenient	Functional	Permeable
Calm	1																		
Wide	.330**	1																	
Entertaining	0.156	.346**	1																
Active	-0.134	.402**	.571**	1															
Long	0.025	.371**	.199*	.267**	1														
lots of opportunities	-0.091	.251**	.359**	.460**	.390**	1													
Lively	-.179*	0.112	.417**	.357**	.325**	.383**	1												
Inexpensive	-0.112	-0.131	-0.042	0.021	-0.103	.183*	0.009	1											
Attractive	0.036	0.132	.467**	.398**	0.136	.580**	.363**	0.148	1										
Peaceful	.178*	0.098	.288**	0.1	-0.07	0.107	-0.015	.178*	.320**	1									
Open	0.161	0.141	.267**	0.114	-0.057	0.152	0.032	.268**	.276**	.364**	1								
Fluent	0.072	0.124	.348**	.256**	-0.013	.232**	0.134	0.007	.355**	.457**	.392**	1							
Inviting	0.126	.259**	.462**	.352**	0.144	.386**	.241**	0.072	.362**	.395**	.229**	.486**	1						
Active	-0.073	0.14	.266**	.287**	.297**	.524**	.287**	.210*	.389**	.241**	0.162	.221*	.256**	1					
Familiar	-0.001	0.085	0.082	0.09	0.17	0.075	.207*	.207*	0.124	.320**	-.172*	0.085	.279**	.228**	1				
Pleasing	0.037	.226**	.423**	.291**	0.125	.296**	.353**	0.095	.329**	.376**	0.139	.234**	.500**	.297**	.422**	1			
Convenient	0.078	.256**	.411**	.255**	0.046	.307**	0.148	0.078	.367**	.349**	.207*	.400**	.504**	.215*	.239**	.544**	1		
Functional	0.121	.233**	.406**	.326**	0.11	.372**	.269**	0.084	.398**	.337**	.212*	.516**	.479**	.366**	.246**	.374**	.588**	1	
Permeable	.280**	.252**	.236**	0.119	0.081	0.159	0.022	0.065	0.129	.287**	.345**	.369**	.404**	0.171	0.021	.266**	.392**	.367**	1

Table 11. Descriptors of indoor shopping centre permeability in order of priority

Physical Features: Accessibility	**Functional Features: Variety**	**Perceptual Features:** Legibility
		Inviting
Open		
		Calm
	Convenient	

Under the concept of legibility, the perceptual properties of pedestrian shopping spaces were defined by the adjective *familiar*. This is based on the fact that, in addition to using such spaces for shopping, people passing through these spaces daily also communicate with others as they move from one place to the next. People form mental images of the spaces they pass through every day and these images leave permanent traces. However, for shopping centers, *familiar* gives way to *inviting*. This situation implies that such spaces are not generally forums for communication, since the property of being *inviting* is associated mainly with the variety of possibilities the shopping centers provide. Therefore, it can be said that users prefer spaces for a variety of reasons depending on the perceptual properties of the type of space.

Viewed from the perspective of variety, it emerges that the adjectives *functional* and *convenient* were associated with the functional properties of both pedestrian shopping spaces and shopping centers, revealing that both provide similar value in that regard.

From the perspective of the important physical property of accessibility, it can be observed that pedestrian shopping streets and the indoor shopping centre were both described as *open*. Fluency is important in allowing people to communicate from one place to another. Pedestrian shopping streets are active, lively spaces at every hour of the day, and thus allow people to enjoy their spare time whenever they have the opportunity. Shopping centers, by contrast, do not exhibit the same liveliness at every hour of the day, and are thus not as fluent. The adjective *open* defines the Forum Shopping Centre perceptually based on its street design concept and the transparent covering over the enclosure. It does not, however, denote that the space is actually open and fluent. On the other hand, this study found that participants described pedestrian shopping streets using the descriptors *fluent*, *functional* and *familiar*, results which may be considered meaningful.

CONCLUSIONS AND SUGGESTIONS

Shopping centers and their increasing popularity represent a growing trend in consumer preference. This study aimed to define the concept of spatial permeability from the perspective of the shopping centre as a public space. In this study, permeability is interpreted as a feature that increases the quality of indoor as well as outdoor spaces. Thus, permeability and its supporting factors were examined in the context of an enclosed shopping centre.

- The analysis of participant comparisons of an enclosed shopping centre and pedestrian shopping streets revealed that participants preferred indoor spaces to outdoor ones for shopping or entertainment. One main conclusion to be drawn was that this situation was the result of changing concepts of shopping and recreation, with comfort emerging as an important determinant of a space's acceptance and use. While pedestrian shopping streets offer opportunities for a variety of activities, shopping centers provide these activities more comfortably by providing them in an enclosed space and gathering them together. Going to the shopping centre has become an activity for people in itself, and devoting a day to such excursions has become a fashion. Pedestrian shopping streets, however, are now perceived by users as spaces where one secures necessities and then moves on. This situation poses a problem for urban designers, given that open spaces that provide support for pedestrian activities have for centuries been considered the beating heart of the city. As these spaces become increasingly inert and unused, the transition could thus negatively affect the quality of urban life.

- Most previous permeability studies have assessed only physical parameters. The present study suggests that the concept of permeability cannot be evaluated getting based on physical attributes alone, but that it is also essential to examine functional and perceptual properties in order to be able to say that a space has the quality of permeability. Therefore, the concept of permeability cannot be considered only in terms of physical attributes. The functional and perceptual dimensions supporting permeability must also be evaluated. Another important result of this study is also to determine the effectiveness of the functional properties in ensuring spatial permeability afterwards.
- The permeability model developed for indoor shopping centers is an important contribution of the study. Within the scope of the physical, functional and perceptual properties, permeability may be defined as accessibility, variety and legibility for pedestrian shopping streets as well as for indoor shopping centers. However, the sub-concepts of *fluent*, *functional* and *familiar* that are connected with pedestrian shopping streets give way to the sub-concepts of *open*, *convenient* and *inviting* for the indoor shopping centre.
- This article offers a guide for determining whether a space is permeable or not, sets forth and explains a set of parameters for permeability, and proves that the definition of permeability may vary depending on the type of space. Furthermore, this study can be useful for researchers by providing a different point of view with respect to other permeability studies.
- Finally, taking into account the outcomes of the study is recommended in order to protect small retailers, ensure the efficiency of retailing, protect the culture in the shopping street, sustain the environmental quality and protect the vitality of urban centers.

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Chapter 15

Endemic Plants of Bursa and Their Landscape Characteristics

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INTRODUCTION

Being at the junction point of the Europe-Siberia, Iran-Turan and Mediterranean plant geographies, Turkey has a rich flora with various climate zones, topographic features, geological and geomorphologic diversity, changing elevation differences, ecological differences and environmental diversity like seas and lakes. It has the characteristics of a continent in terms of plant diversity with its plant taxon of around 12000 and 34% of its species (3925) being endemic. While some of the deployed endemic plant species of Turkey reveal narrow deployment and others reveal wide deployment. Narrow deployed endemics maintain their lives mostly on certain mountains, mountain chains and certain habitats. The endemism rate go up to 25-40% especially on the high mountain steppes (Ekim, 1990; Ekim *et.al*, 2000; Atik *et.al.*, 2010; Yaltırık & Efe 1989; Kaya, 2014).

A widespread loss of diversity is observed worldwide because of the pressure of natural ecosystems and global changes (Rotllan-Puig & Traveset, 2016). The natural ecosystem has been continuously disrupted with the pressure of urbanization and industrialization, and the existing natural resources gradually decrease. The loss of biodiversity includes both species and the interactions between species. Ecosystem services and the functionality of species occur quicker than the loss of species (Valiente-Banuet *et.al*, 2015).

However the destruction of the natural vegetation that exists in the ecosystem takes place directly with the human influence such as extreme grazing, forest fires, improper land use, insensible and extreme harvesting (Karahan 1998). In this regard, it is important to determine the existence of plants, evaluate their state of protection and prevent their extinction. For that purpose, hazard classes of Turkey's endemic plants were determined according to the criteria of the International Union for Conservation of Nature (IUCN), and they were indicated in the work named "The Red Book of Turkey's Plants" (Daşkın & Kaynak, 2011; Ekim *et.al*, 2000).

Plants constitute the main source of the landscape design works, and they are the main elements that characterize the natural landscape with their functional and physical features (Eroğlu, 2015). The employability of plants in landscape is equivalent to the areas the plants exist in the nature. It is surely beyond doubt that the designs that are created by considering the environments in which the plant grows will give the most

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effective results. The forms that plants take according to their altitude and their growing environment directly affect their utilization in landscape design and implementations (Karahan, 1998).

Utilizing the endemic or non-endemic natural vegetation has great importance in design. The topographic structure of a region (such as the lowlands, valleys, mountains and highlands of the region) and the volumes, shapes and colors of natural plant communities of that region together generate effective compositions and therefore constitute the natural landscape of that region. Natural plant species have many positive features such as enabling the sustainability of the landscape, having good and easy accommodation to environmental conditions, supporting the wildlife, being resistant and requiring little handling. Natural plant species are utilized also in creating corridors that enable passes between natural vegetation and urban landscape (Korkut 1993; Karahan 1998; Krischik, Reed & Willey 2000; Barış, 2002, Deniz & Şirin, 2005).

ENDEMIC PLANTS OF BURSA

The Province of Bursa is located in the basin of Susurluk, and it is between the 39° 35’-40° 40’ northern latitudes and 28° 10’-30° 00’ eastern longitudes. The Province of Bursa is surrounded by Yalova and Kocaeli to its north, Bilecik to its east, Kütahya to its south and Balıkesir to its west, and its surface area is 1,104,301 hectares. Being located in the coastline of Marmara Sea, the Province of Bursa is predominated by the Mediterranean climate in which summers are dry and hot and winters are warm and rainy. Semi-continental climate is seen in the inner parts of the province that are far from the sea. Although the lowland of Bursa reveals the general features of the Mediterranean climate, the average temperature of the region is low, the annual precipitation total of the region is high and the monthly distribution of precipitation is relatively regular as compared with the Mediterranean region. According to the De Martonne Aridity Index Equation, summer months reveal the arid climate characteristics whereas fall and spring months reveal the less humid climate characteristics. The data of the last 65 years show that the average temperature is 14.4°C, the average relative humidity is 68.6% and the annual precipitation total is 691.9 mm (Zencirkıran, 2004; Zencirkıran, 2009; Seyidoğlu *et.al.,* 2010).

Bursa is the 4th biggest city of Turkey, its important area of plants is the Uludağ region and it is in an important position in terms of plant diversity. The fact that there is vertical elevation between the peak of Mount Uludağ (2543) – one of the centers of winter tourism – and the lowland of Bursa (150 m) leads to climate changes and that region includes various vegetation zones and rich vegetation. The vegetation zones Lauretum, Castanetum, Fagetum and Abietum appear in low altitudes, and the Alpinetum vegetation zone that is comprised of *Astragalus, Acantholimon*, *Daphnea oleioides*, *Vaccinium myrtillus*, *Crocus aureus*, *Scilla bifolia*, *Juniperus communis nana* appears in the highest altitude. Mount Uludağ is an “Important Plant Zone” and contains many endemic species in it. However the fact that recreational pressures being intense in Sarıalan, Çobankaya, Karabelen and Kirazlıyayla causes the endangerment of the natural flora and therefore endemic species (Koç, 1977; Kaynak *et.al.*, 2005; Akdeniz *et.al.,* 2015).

The Province of Bursa falls within the A2 and B2 square in terms of plant geography. The sources and previous works about Bursa reveal that there are 74 genuses and 130 endemic species belonging to 29 families, and the rate of endemism is

13.40%. The classification of endemic taxons according to families of the Province of Bursa is given in Table 1, and the distribution of genuses and species according to families is given in Figure 1 (Davis 1965-1985; Mengili, 1986; Tarımcılar & Kaynak, 1994; Tarımcılar & Kaynak 1995; Güleryüz, 2000, Günay, 2001, Kaynak *et.al*. 2005; Daşkın & Kaynak, 2011; Url 2).

As seen in Figure 1, the Asteraceae family has the highest genus (18.92%) and species (16.15%) rates. We can give the *Doronicum bithynicum* subsp. *bithynicum, Senecio hypochionaeus* var. *Hypochionaeus, Senecio olympicus, Achillea multifida, Tripleurospermum pichleri, Cirsium poluninii, Cirsium leucopsis, Carduus olympicus* subsp. *olympicus, Centaurea olympica, Centaurea consanguinea, Centaurea drabifolia* subsp. *drabifolia, Tragopogon oligolepis, Picris olympica, Hieracium bithynicum, Hieracium leptodermum, Hieracium bornmuelleri, Hieracium noeanum, Pilosella hoppeana* subsp. *lydia, Taraxacum turcicum, Crepis aurea* subsp. and *Olympica* species as examples. The families that contain the least number of genuses are Pinaceaee Ranunculaceae, Polygonaceae, Guttiferae, Linaceae, Geraniaceae, Dipsaceae, Primulaceae, Euphorbiaceae, Rubiaceae, Amaryllidaceae, Iridaceae and Junaceae families with 1.35%. The families that contain the least number of species are represented with one species, and they are Pinaceae, Ranunculaceae, Dipsaceae, Primulaceae, Euphorbiaceae, Amaryllidaceae, Geraniaceae and Junaceae.

However the endemic taxons have been classified according to danger categories by making benefit of “The Red Book of Turkey’s Plants” and “IUCN Red List Categories” (Ekim *et al,* 2000; IUCN 2010) (Table 2).

THE VEGETATION CHARACTERISTICS OF ENDEMIC PLANTS

The vegetation characteristics of the endemic plants of Bursa were evaluated according to their longevity, expansion elevations and natural expansion areas (Davis 1965-1985; Mengili, 1986; Tarımcılar & Kaynak, 1994; Tarımcılar & Kaynak, 1995; Güleryüz, 2000, Günay, 2001, Kaynak *et.al*. 2005; Daşkın & Kaynak, 2011; Url 2). 81.54% of the endemic taxons are composed of perennial plant species, 13.85% of them are composed of biennial plant species and 4.62% of them are composed of annual plant species. Expansion elevations vary and endemic species exist in almost all elevation ranges. 20.67% of them are located in the range of 0-500 m, 12.50% of them are located in the range of 500-1000 m, 18.75% of them are located in the range of 1000-1500m, 20.19% of them are located in the range of 1500-2000 m, 21.15% of them are located in the range of 2000-2500 m and 6.73% of them are located above 2500 m. However overwhelming majority – 32.02% and 27.53% - of the endemic taxons reveal expansion in rocky, stony slopes, inclined areas, forested land and brushy areas, 12.36% of them in streamside areas and humid areas, 10.67% in meadow, pasture and fallow areas, 8.43% in subalpine and alpine areas and steppes, 3.93% in lawn areas, 2.81% in roadside areas and 1.12% in mountain peaks, mountain sides and crests.

SOME ENDEMIC PLANTS TO BE USED IN DESIGN AND THEIR FEATURES

Some species from endemic taxons of the Province of Bursa were determined considering their tissue, form, color, flower and fruit features and their conditions of existence in their natural environment, and their botanical features, state of endemism, expansion elevation, habitat and features for use are given below (Table 3-20) (Davis

1965-1985; Karahan, 1998; Karahan & Yılmaz, 2001; Kaynak *et.al*. 2005; Kaya, 2014).

Table 1. Distribution of endemic plants of Bursa according to families

Family	**Taxons**
Amaryllidaceae	*Galanthus plicatus* subsp. *byzantinus*
Apiaceae	*Eryngium bithynicum, Bupleurum setaceum, Olymposciadium caespitosum, Ferulago macrosciadia, Ferulago silaifolia,, Peucedanum graminifolium,Heracleum platytaenium*
Asteraceae	*Doronicum bithynicum* subsp. *bithynicum, Senecio hypochionaeus* var. *hypochionaeus, Senecio olympicus, Achillea multifida, Tripleurospermum pichleri, Cirsium poluninii, Cirsium leucopsis, Carduus olympicus* subsp. *olympicus, Centaurea olympica, Centaurea consanguinea, Centaurea drabifolia* subsp. *drabifolia, Tragopogon oligolepis, Picris olympica, Hieracium bithynicum, Hieracium leptodermum, Hieracium bornmuelleri, Hieracium noeanum, Pilosella hoppeana* subsp. *lydia, Taraxacum turcicum, Crepis aurea* subsp. *olympica, Uechtritzia armena*
Brassicaceae	*Thlaspi jaubertii, Alyssum erosulum, Arabis drabiformis, Aubrieta olympica, Matthiola montana*
Boraginaceae	*Echium orientale, Onosma velutinum, Onosma bornmuelleri*
Campanulaceae	*Campanula lyrata* subsp. *lyrata*, *Campanula betonicifolia, Campanula latiloba* subsp. *latiloba, Asyneuma rigidum* subsp. *sibthorpianum, Jasione supina* subsp. *supina*
Caprifoliaceae	*Lonicera caucasica* subsp.*orientalis*
Caryophyllaceae	*Minuartia anatolica* var. *anatolica, Dianthus leucophaeus* var. *leucophaeus, Dianthus recognitus, Dianthus artwinensis, Dianthus cibrarius, Gypsophila olympica, Silene olympica*
Dipsacaceae	*Knautia byzantina*
Euphorbiaceae	*Euphorbia cardiophylla*
Fabaceae	*Astragalus macroscepus, Astragalus mesogitanus, Astragalus xylobasis* var. *angustus, Astragalus hirsutus, Lathyrus undulatus, Trifolium caudatum, Astragalus prusianus, Astragalus venulosus, Astragalus sibthorpianus, Astragalus asciocalyx*
Geraniaceae	*Erodium sibthorpianum* subsp. *sibthorpianum, Erodium olympicum*
Guttiferae	*Hypericum adenotrichum, Hypericum aviculariifolium* subsp. *byzantinum*
Illecebraceae	*Herniaria olympica, Paronychia amani* var. *Amani, Paronychia chionaea* subsp. *chionaea* var. *latifolia*
Iridaceae	*Crocus gargaricus* subsp. *gargaricus, Crocus gargaricus* subsp. *herbertii, Crocus biflorus* subsp. *pulchricolor, Crocus antalyensis*
Juncaceae	*Juncus anatolicus*
Lamiaceae	*Phlomis russeliana, Lamium veronicifolium, Sideritis dichotoma, Stachys tmolea, Stachys sosnowskyi, Thymus bornmuelleri*
Linaceae	*Linum olympicum, Linum hirsutum* subsp. *anatolicum* var. *platyphyllum, Linum tmoleum*
Liliaceae	*Allium sibthorpianum, Allium flavum subsp. flavum* var. *minus, Allium olympicum, Ornithogalum uluense, Ornithogalum joschtiae, Muscari bourgaei, Fritillaria bthynica, Gagea bithynica*
Orchidaceae	*Epipactis pontica, Epipactis bithynica, Dactylorhiza nieschalkiorum*
Papaveraceae	*Papaver pilosum* subsp. *pilosum, Corydalis wendelboi* subsp. *congesta, Corydalis lydica, Corydalis oppositifolia* subsp. *oppositifolia.*
Pinaceae	*Abies nordmanniana* subsp.*bornmülleriana*
Primulaceae	*Cyclamen cilicium* var. *cilicium*
Poaceae	*Bromus cappadocicus* subsp. *sclerophyllus, Bromus sipyleus, Alopecurus gerardii* var. *cassius, Alopecurus lanatus, Festuca cyllenica* subsp. *uluana, Festuca decolorata, Festuca rubra* subsp. *pseudorivularis, Festuca punctoria, Festuca paphlagonica* subsp. *paphlagonica*

Polygonaceae	*Rumex olympicus, Rumex bithynicus*
Ranunculaceae	*Ranunculus fibrillosus*
Rosaceae	*Potentilla buccoana, Alchemilla hirsutiflora, Alchemilla bursensis*
Rubiaceae	*Galium fissurense, Galium olympicum*
Scrophulariaceae	*Verbascum bombyciferum, Verbascum simavicum, Verbascum prusianum, Verbascum parviflorum, Verbascum lydium* var. *lydium, Verbascum bithynicum, Verbascum olympicum, Verbascum tossiense, Verbascum biledschikianum, Verbascum nudatum* var. *nudatum, Verbascum transolympicum, Euphrasia minima subsp. davisii, Pedicularis olympica*

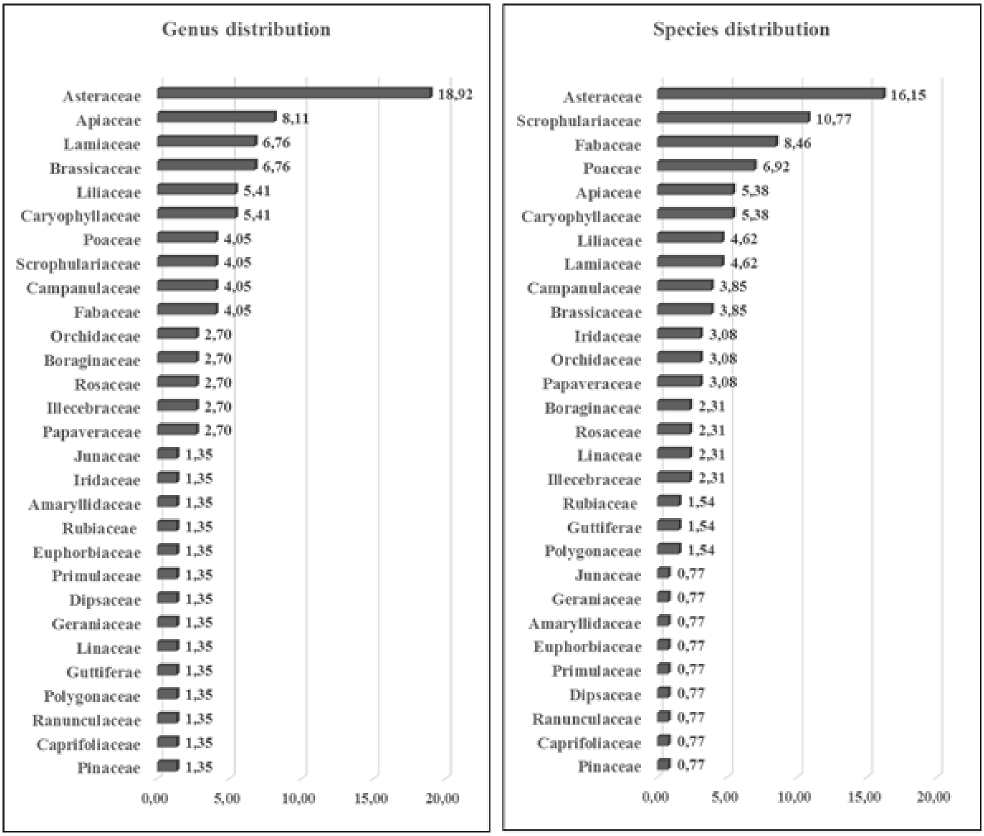

Figure 1. Genus and species distributions of endemic taxons according to families

Table 2. Classification of the endemic taxa according to their danger categories

Danger Categories	Number of taxa (N)	Percentage (%)
CR (Critically endangered)	3	2.40
EN (Endangered)	21	16.80
VU (Vulnerable)	15	12.00
LR (cd) (Conservation dependent)	14	11.20
LR (nt) (Near threatened)	15	12.00
LR (lc) (Least concern)	52	41.60
DD (Data deficient)	5	4.00

Table 2 reveals that 41.60% of the endemic taxons are in the LR (lc – least concern) category, 16.80% are in the EN (endangered) category and 12.00% are in the VU (vulnerable) and LR (nt – near-threatened) category. The species such as *Festuca decolarata* (CR-Ekim *et.al*, 2000), *Gypsophylla olympica* (CR - Daşkın and Kaynak, 2011), *Uechtritzia armena, Verbascum transolympicum*, *Aubritea olympica* (EN – Ekim *et.al.*, 2000) are endangered species.

Table 3: *Achillea multifida* (DC.) Boiss.

 (Photo: Zencirkiran, 2016-Original)	**Botanical Features**: Perennial herb with 10–30 cm high stems. Leaves green, with indumentum of loose spreading hairs. Basal leaves 2–3-pinnatifid to pinnatisect, lanceolate-oblong, 2–4 × 0.8–1 cm, primer segments 6–10 pairs, ultimate lobes linear, 1–3 × 0.2–0.7 mm, subacute. Median cauline leaves 2–4 × 0.8–1.5 cm. Capitula 3–20 in 2–6 cm broad corymbs. Peduncles 2–15 mm. Involucre hemispherical to depressed, 3.5–4 × 4–6 mm. Outer phyllaries lanceolate, subacute, 1–1.5 mm. Inner phyllaries broadly obovate, obtuse, 3–3.5 mm, with brownish scarious, 0.3–0.5 mm margins. Ligules 6–9, white, 3–4 mm, oblong-ovate. Disc flowers 40–50, yellow. Flowering: July - September.
Endemism	It is endemic to Bursa
Elevation (m)	1700 – 2550
Habitat	The *Abies nordmanniana* subsp. *bornmülleriana* (The Nordmann Fir) is located in glades, alpine slopes, and water and road sides.
Features for Use in Landscape Design	It is used in borders and rock gardens. It has a medical and aromatic property. It has scent and utilized in cosmetics.

Table 4: *Arabis drabiformis* Boiss.

 (Photo: Daşkın, 2011)	**Botanical Features**: Perennial herb with a stout woody stock; stems 7–14 cm, erect, glabrous, unbrached. All leaves in basal rozettes, oblanceolate, 5–7 × 1.5–2 mm, setose-pilose. Sepals saccate, 3 × 1 mm, glabrous, palebrown, with narrow scarious margins. Petals white, 4–6 × 2–3 mm. Siliquae 18–20 × 2 mm, adpressedpatent, glabrous, the valves with a conspicuous median nerve. Flowering: June-August.
Endemism	It is endemic to Bursa
Elevation (m)	2100-2300
Habitat	It is located between rocks and in rocky, stony

	slopes.
Features for Use in Landscape Design	It is used in borders and rock gardens, and used together with herbaceous species

Table 5: *Astragalus sibthorpianus* Boiss.

 (Photo: Kaynak et al. 2005)	**Botanical Features:** Dwarf, prostrate, suffrutescent perennial herbs. Stems 10 cm. Leaves 1 cm, Leafletss 3 mm, narrowly obovate, densely bifurcate-pilose, 9-10 paired. Stipules 5 mm, ovate lanceolate, drying brownish. Peduncules 1 cm. Inflorescense 1.5-2 cm in diam. a dense, globose to oblong. 20 flowered spike. Bracts 5 mm. lanceolate. Calyx 7 mm., campanulate, densely White bifurcate-pilose, at least when young; teeth 4 mm, linear. Corolla deep brick red, standart 12 mm, ligulate. Legume ovate, obtuse, crisped - hairy mucronulate. Flowering: June-July
Endemism	It is endemic to Bursa
Elevation (m)	2100-2400
Habitat	It is located on the stony slopes of the alpine zone.
Features for Use in Landscape Design	It is used in rock gardens, it is appropriate for use as ground cover plant and on waterfronts.

Table 6: *Aubrieta olympica* Boiss.

 Photo: Zencirkiran, 2016-Original)	**Botanical Features** Perennial herbs. Stems prostrate. Leaves oblanceolate, dentate, the lower frequently subopposite. Sepals saccate. Petals violet, 11-19 mm. Fruits oblong, flattened, 15-18 x 4.5-5.5 mm, glabrous, or with a sparse indumentum of stellate hairs. Style 4-8 mm. Flowering: June-September
Endemism	It is endemic to Bursa
Elevation (m)	200-2400
Habitat	It is located on rock faces and rocky and stony slopes.
Features for Use in Landscape Design	Its use is appropriate in rock gardens, borders and other herbaceous species. It is an appealing plant for birds and insects.

Table 7: *Crocus gargaricus* subsp. *herbertii* Mathew

 (Photo: Kaynak et.al. 2005)	**Botanical Features** Corm often producing stolons; tunic finely reticulate-fibrous. Leaves 3-4, synanthous, 2 mm broad. Throat of perianth yellow, glabrous; segments deep yellow or orange. 1,5-3,5 x 0.5-1.1 cm, sometimes outside stripes, bronz of purple, rarely creamy-white. Filamnets 3-6 mm, yellow pubescent; anters 6-12 mm yellow, Style dividing into 3 slightly fimbriate orange branches. Flowering: April-May.
Endemism	It is endemic to Bursa
Elevation (m)	1370-1800
Habitat	It is located in humid, meadow areas.
Features for Use in Landscape Design	It is used in borders, humid areas, grass areas and mass vegetation.

Table 8: *Campanula betonicifolia* Sm

 (Photo: Zencirkiran, 2016-Original)	**Botanical Features** Silky tomentose or subhirsute biennial herbs. Stem erect, branched. Basal leaves ovate or elliptic-oblong, crenate-serrate, with lobulate or entire petiole. Lower cauline leaves similar or subsessile. Flowers medium-sized, shortly pedicellate or subsessile, mostly solitary. Calyx lobes ovate, acute, more than 1/2 length of corolla tube. Appendages ovate, finely pubescent, wholly concealing ovary. Corolla cylindrical, small, blue, tube 6-8 x 5 mm. Flowering: June-July.
Endemism	It is endemic to Turkey
Elevation (m)	600-1800
Habitat	It is located in shady areas.
Features for Use in Landscape Design	It is used in rock gardens, under trees and bushes and shady areas.

Table 9: *Crocus biflorus* subsp. *pulchricolor* (Herbert) Mathew

 (Photo: Zencirkiran, 2016-Original)	**Botanical Features** Corm tunic membranous or coriaceous Leaves 3-5, not more than 1 mm broad, synanthous. Bracteole present, subequal to or much narrower than bract. Flowers usually deep blue violet. Bracts drying brownish or reddish. Throat of perianth pale to deep yellow, glabrous or finely papillose; segments 1.7-3.5 x 0.5-1.3 cm, subacute, obtuse or rounded, lilac or blue. Filaments 3-7 mm, white or yellow, glabrous or finely papillose. Anthers 0.8-1.4 cm, yellow. Style dividing into 3 yellow to reddish-orange slender or expanded branches. Flowering: February-July.
Endemism	It is endemic to Turkey
Elevation (m)	200-3000
Habitat	It is located in *Abies – Fagus* glades, alpine meadows and dwarf juniper communities.
Features for Use in Landscape Design	It is appropriate to use it in rocky gardens, open areas and together with the other herbaceous species.

Table 10: *Dactylorhiza nieschalkiorum* H. Baumann & Künkele

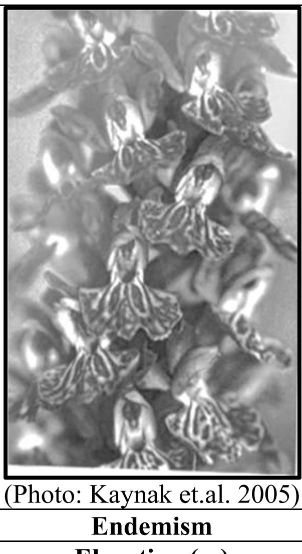 (Photo: Kaynak et.al. 2005)	**Botanical Features** Plants usually robust, 15-70 cm. Stem mor or less hollow with 3-5 well developed leaves. Leaves broadly elliptic-obovate to lanceolate, 15-20 x 3-6 cm, upper bract-like, unspotted or with smaller spots, spots mainly concentrated towards apex. Spike pyramidal at first, later broadly cylindrical, mostly very dense, to 15-20 cm long and 6 cm diameter. Flowers rose purple. Sepals and petals lanceolate to ovate-lanceolate, more or less acuminate, tips often arched, to 16 mm. Labellum roundish or transversely oblong, usually broader than long, 10-15 x 12-20 mm. densely covered with small dots and/or fine broken lines, subentire or almost lobed at apex, margins erose-dentate. Spur broadly, cylindirical, straight, 11-15 x 3-5 mm, nearly as long as ovary. Flowering: June-August.
Endemism	It is endemic to Turkey
Elevation (m)	1600-1800
Habitat	It is located in stream sides, watersides, swamp stream sides and humid meadows.
Features for Use in Landscape Design	It is appropriate to use it in borders, humid areas, watersides and together with the other herbaceous species.

Table 11: *Fritillaria bithynica* Baker

 (Photo: Seyidoğlu Akdeniz, 2016. Original)	**Botanical Features** Bulbs up to 2 cm diameter, sometimes with bulblets. Stem 7-20 cm, smooth. Leaves 5-12, usually 6-8; lowest 2-6 x 0.7-1.8 cm, oblanceolate to ovate, usually opposite. Bract leaves 1-4 cm, usually in a whorl of 3, sometimes opposite or solitary. Flowers 1-2; Perianth narrowly campanulate, outside glaucous-green to yellowish-green, sometimes with purple markings, inside greenish-yellow, outer segments 0.7-1.2 cm obovat, cuneate. Nectaries 3x1 mm, lanceolate, brown or green, at base of perianth. Filaments 5-9 mm, slender, papilose, Style 7-10 mm, slender straight-sided, smooth. Capsule usually with 6 wings, 10 mm broad, tapering towards base. Flowering: March-May.
Endemism	It is endemic to Turkey
Elevation (m)	470-1500
Habitat	It is located in *Fagus – Pinus* glades and *Quercus* bushes.
Features for Use in Landscape Design	It is used in borders, rock gardens, under trees and bushes and shady areas.

Table 12: *Erodium olympicum* Gemici & Leblebici

 (Photo: Kaynak et.al. 2005)	**Botanical Features** Dioecious perennial with few lax rosettes. Stem 7-12 cm, densely, glandular with short and long eglandular patent hairs. Basal leaves bipinnatisect, greenish, with sparse glandular and more or less adpressed eglandular hairs; blade ovate-oblong. Inflorescence densely covered with long and short glandular hairs, sparsely crisped pubescent. Sepal 5-6 mm, not reflexed, glandular with long and short hairs; hairs at apex eglandular up to 1.7 mm long. Petals white, 8-10 mm long, broadly obovate. Beak of fruit 4-4.5 cm, stout, glandular below; mericarp 7-9 mm, pilose and short glandular, without furrow beneath; fovelose glandular hairy. Flowering: July-August.
Endemism	It is endemic to Bursa
Elevation (m)	2200-2400
Habitat	It is located in stony-rocky slopes and in the cracks and fractures.
Features for Use in Landscape Design	It can be used in rock gardens and borders with other herbaceous species.

Table 13: *Galanthus plicatus* M. Bieb. subsp. *byzantinus* (Baker) D.A. Webb

 (Photo: Kaya, 2014)	**Botanical Features** Bulb subglobose to ovoid, 2-2.5 x 1.5-1.7 cm. Leaves narrowly oblanceolate to strap shaped, margins explicative in bud, sometimes only slightly revolute at maturity, 5-21 x 1-1.5 cm at anthesis, to 29-30 x 1.8-2 cm and upright at maturity, apex obtuse, cucullate, glaucous, often with a paler central band on upper surface. Scape 9-22 cm. Outer perianth segments convex, elliptic to –obovate, 17-28 x 6-12 mm, inner segments flat, not flared at apex, oblong-spathulate, 8-10 x 4-7 mm, with separate green patches at base and apex, sometimes joined in centre. Filaments 0.5-1 mm, anthers 6-7 mm, Capsule ellipsoid to subglobose, 16-12 mm. Flowering: January-February.
Endemism	It is endemic to Bursa
Elevation (m)	45-1100
Habitat	It is located in *Abies* – *Fagus* glades, stony – rocky slopes and rock fractures.
Features for Use in Landscape Design	It can be used in rock gardens, borders with other herbaceous species and on grass area.

Table 14: *Galium olympicum* Boiss.

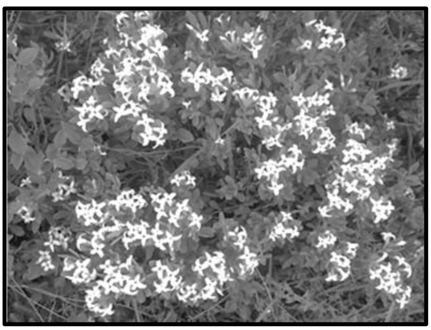 (Photo: Zencirkiran, 2016-Original)	**Botanical Features** Dwarf caespitose perennial. Stem 2-3 cm, glabrous, very densely leafy; internodes very short, hardly visible, rarely to 10 mm after flowering. Leaves in whorls of 6, imbricate, 5-7.5 x 0.5-0.6 mm, linear-subulate, needle-like, acuminate-aristate, awn to 1.5-2 mm, margin slightly incrassate, sparingly scabrid-ciliolate to glabrous, dull, straw-yellow on drying; vein distinct, 1.5-2.5 mm broad beneath. Inflorescence extremely reduced, 1-3 flowered, leafy; pedicel 1-3.5 mm, glabrous. Calyx teeth absent. Corolla white, 2-3 mm, subcampanulate; tube 0.7-0.8 mm, lobes lanceolate, cucullate, 1.5-2 mm. Mericarps ovoid, smooth, glabrous. Flowering: June-August.
Endemism	It is endemic to Bursa
Elevation (m)	1800-2500
Habitat	It is located in rock fractures, dwarf *Juniper* communities and stony – rocky slopes.
Features for Use in Landscape Design	It can be used in rock gardens, borders and ground cover.

Table 15: *Gypsophila olympica* Boiss**.**

 (Photo: Kaynak et al. 2005)	**Botanical Features** Caespitose perennial, rhizome woody. Stems numerous, unbranched, 3-15 cm, glabrous, with glandular-pubescent bracts and calyx. Leaves linear, riquetrous, acute, 5-10 x 0.5-1 mm, scabrid at margins, mostly congested at base. Flower clusters single (rarely two), terminal, 7-10 mm diameter. Bracts ovate, acuminate. Calyx campanulate, 2.5-3.5 mm, glandular-hairy, with shortly acuminate teeth. Petals cuneate, obtuse, white too pink, 4-5 mm. Seeds, with acute tubercles. Flowering: July-August.
Endemism	It is endemic to Bursa
Elevation (m)	2200-2300
Habitat	It is located in rock fractures and stony – rocky slopes.
Features for Use in Landscape Design	It can be used in rock gardens, borders and as ground cover.

Table 16: *Juncus anatolicus* Snog.

 (Photo: Zencirkiran, 2016-Original)	**Botanical Features** Perennial with strong rhizome, caespitose to mat-forming. Stems 10-40 cm, with 1-3 leaves. Leaves 3-20 cm, 0.5-1.5 mm thick, septate, with 9-17 longitudinal ridges. Inflorescence of 1 cluster, usually 50-100 flowered. Perianth segments 3-3.7 mm, subequal, narrowly ovate, acuminate-cuspidate, dark brown. Stamens 6; anters 0.65-0.85 mm. Style 0.9-1.1 mm, stigmas 1.3-1.8 mm. Capsule ovoid-trigonous, equaling perianth. Tapering to long mucro, dark at apex. Flowering: June-September.
Endemism	It is endemic to Turkey
Elevation (m)	1700-2200
Habitat	It is located around puddles, stream sides and humid meadows.
Features for Use in Landscape Design	It can be used in waterfronts and humid areas. They are appealing for birds and insects.

Table 17: *Linum olympicum* Boiss.

 (Photo: Zencirkiran, 2016-Original)	**Botanical Features** Suffruticose perennial with very twiggy, procumbent base, and numerous sterile shoots. Flowering stems slender, procumbent or ascending, 7-20 x 0.5-1 mm adpressed-pilose. Median cauline leaves elliptical –oblong, acute, 1-3 nerved, adpressed-pilose or subsericeous (rarely glabrescent), 9-22 x 1.75-3.75 mm, upper leaves with or without a few marginal glands; lower leaves and those of sterile shoots spathulate ellilptical or oblanceolate, acute. Cymes 1-7 flowered, contracted and often with monochasial brances. Outer sepals ovate-lanceolate, subacuminate, 5-10 mm. Petals 25-30 mm, lavender-blue. Capsule 5-6 mm. flowering: June-August.
Endemism	It is endemic to Turkey
Elevation (m)	800-2400
Habitat	It is located on stony-rocky slopes, rock faces, rock limestone slopes, bushes, sides of calabrian pine forests and terrace sets.
Features for Use in Landscape Design	It can be used in rock gardens, borders and with other herbaceous species. It is resistant to hot and sunny conditions.

Table 18: *Phlomis russeliana* (Sims.) Bentham.

 (Photo: Url 1)	**Botanical Features** Herb to 100 cm, eglandular. Leaves greenish, loosely adpressed stellate-tomentose above, densely whitish stellate-tomentose benath. Basal leaves broadly ovate-cordate, obtuse, coarsely crenate, 6-20 x 6-12 cm, petiole to 28 cm. floral leaves shortly petiolate, ovate-lanceolate, acuminate. Verticillasters 2-5, distant, 12-20 flowered. Bracteoles numerous, subulate, curved upwards, 10-20 x 1-2 mm. densely stellate-tomentose. Calyx 20-25 mm densely stellate-tomentose, teeth spreading, 2-5 mm, subulate. Corolla yellow, 30-35 mm, upper lip galeate, ciliate. Nutlets glabrous. Flowering: May-September.
Endemism	It is endemic to Turkey
Elevation (m)	300-1700
Habitat	It is located together with coniferous and deciduous trees.
Features for Use in Landscape Design:	It can be used in rock gardens, borders, coastal areas, with other herbaceous species and as cut flower. It is resistant to hot and sunny conditions.

Table 19: *Muscari bourgaei* Baker

 (Photo: Zencirkiran, 2016-Original)	**Botanical Features** Bulb 1-2.5 mm diameter, usually not proliferating; tunics dirty ivory. Leaves 2-8, patent or erect, linear-suboblanceolate, 5-15 cm x 2.5 mm, canaliculate, apex obtuse, upper surface glaucous, with a narrow pale median band of hinge cells. Scape 4-15 cm, overtopping leaves. Raceme rather lax, broadly ovoid-oblong, 2-3 cm x 10-15 mm. not elongating in fruit, only 15-40 flowered, flowers often imbricate. Pedicels of fertile flowers deflexed and 1-3 mm in flower, horizontal and to mm in fruit. Fertile flowers obovoid to oblong-urceolate, 4-4.5 x 2.5-3 mm., strongly constricted, bright blue or violet blue tube; lobes 1 mm, white or pale bluish. Stamens subuniseriate, attached in middle of tube. Pedicels of sterile flowers ascending, 0.5-1 mm. Sterile flowers oblong-urceolate to attenuate, 3-5 mm, divaricate to patent, the same colour or paler than fertile flowers. Capsule ovoid-orbicular, 6-12 x 6-10 mm, emarginate. Flowering: May-July.
Endemism	It is endemic to Turkey
Elevation (m)	1500-3000
Habitat	It is located on rocky-stony slopes, calcareous volcanic matters and mountain meadows.
Features for Use in Landscape Design	It can be used in rock gardens, borders, under trees and bushes, open areas and with other herbaceous species.

Table 20: *Thymus bornmuelleri* Velen

 (Photo: Zencirkiran, 2016-Original)	**Botanical Features** Loosely caespitose. Flowering stems 4-19 cm, retrorsely hairly all round, in rows from stout, woody, procumbent branches, each with well-developed axillary leaf fascicles and ending in an inflorescence. Flowering stem leaves all subequal, 5.5-10 x 2.5-7 mm, elliptic-obovate to nearly rotund, obtuse, cuneate, shortly petiolate to nearly sessile, glabrous, weakly cilicate basally; oil dots red, numerous numerous; lateral veins 2-3 pairs, prominent, joining to form a marginal thickening. Inflorescence a loose head or spike-like, to 10 cm, with lowest 1-5 verticillasters remote; cymes many-flowered, usually conspicuously pedunculated. Bract similar to leaves and not larger, lateral veins usually 3 pairs. Bracteoles usually 1.5-2.5 mm, nearly leaf like. Calyx 3.3-5 mm (the highest values from fruiting stages), tube equaling to somewhat shorter than lips, pilose (especially ventrally), oil dots red, numerous; upper lip equaling lower teeth; upper

	teeth 0.6-1.2 mm, cilicate. Corolla pale, 5-5.5 mm. Flowering: July-September.
Endemism	It is endemic to Bursa
Elevation (m)	1200-2500
Habitat	It is located in the open areas of *Abies – Fagus -Pinus* forests, rocky-stony slopes and dwarf juniper communities.
Features for Use in Landscape Design:	It can be used in rock gardens, borders, containers and as indoor plant. It has medical, aromatic and scent features.

CONCLUSION AND RECOMMENDATIONS

The Province of Bursa and the area around it – especially Uludağ – is one of the rare areas with its natural plant diversity and high endemism rate (13.14%). In the recent years, Uludağ has been under the intense pressure of people due to the fact that it is a region that hosts winter and summer tourism. In addition, Turkey's natural riches have been negatively affected with the increase of housing. In this regard, it is important that biodiversity and the expansion areas of the plant species that have high landscape value are protected.

It is possible to create beautiful and impressive compositions by considering the esthetic impacts of endemic taxons – like form, tissue, color, flower and fruit features – as well as the functional impacts of them. In design, it is important that plants are kept in habitats that are close to their natural habitats. The majority of the endemic taxons of the Province of Bursa reveal natural expansion in sloping areas, rocky slopes, forestland and bushes and stream and creek sides. In this regard, lots of endemic species can be preferred in many areas such as rock gardens, borders, with other herbaceous plants, open areas and waterfronts. In addition, there are also endemic species that are appropriate for use as ground cover, with medical and aromatic purposes and to create an appealing environment for insects and bees.

Consequently, it would be appropriate to provide awareness of the society for the endemic plants of the Province of Bursa, implement protective works for endangered species by paying regard to the protection-usage balance, produce the species that can be used in landscape design within the context of adaptation works and bring these species in the sector.

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Chapter 16

Explicating the Historical Landscape Approach According to Renovation Projects of Historical Environment in Turkey

Aysun TUNA*

INTRODUCTION

Historical landscapes are the cultural memorial sites of the civilizations that reflect the signs of humans' lives by carrying the knowledge resources of the past until today. Protection of historical landscapes is very important from the perspectives of contributing to the protection of the urban culture and establishment of sustainable cities. Thus, the approach of historical urban landscape emerges in the transformation of historical cities that have international importance into sustainable cities. This study investigates the competitions of "*Encouraging Projects and Practices of Protecting Historical Cultural Heritage"* with the aim of identifying the approaches of local authorities in the protection of historical urban landscape within the historical environment protection activities of Turkey. This competition has been ongoing since 2002 to provide incentive to the cultural heritage protection activities of member municipalities of Union of Historical Towns. The findings are used in developing suggestions for the protection and management of historical urban landscape in Turkey.

Historical environments, making up the cultural memory of societies, face with uncontrolled structuring pressure introduced by the era with their socio-cultural and spatial pasts. One of the basic problems in all settlements, primarily in cities where population and economy drifts in the world today, is the harmony of socio-cultural and spatial topography that has accumulated throughout the history of the city and new era developments; it is the integration of these without conflict and dissociation (Dinçer, 2012). In addition to the expansion in the 'protected value' concepts in the development of historical environment protection as a modern scientific discipline from archeological and movable artwork to unmovable artwork, from monumental to civil, from a single structure to environmental scale and from natural environment to integrated cultural landscaping, it is seen that protected 'intervention' concepts move from 'curatorial' and elitist approaches to 'urbanistic', civil and society-focused approaches (Yıldırım, 2009). Today, UNESCO's Historic Urban Landscape Recommendation Decision based on these approaches in many cities in the world is crucial.

THE HISTORIC URBAN LANDSCAPE RECOMMENDATION OF UNESCO

The historic urban landscape recommendation decision of UNESCO suggests that a new practice is developed to protect urban heritage coping with today's globalization dynamics and based on the requirement that the interaction between the natural and

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structured environment is based on the adaptation of elements such as sentimental values by considering that layering of old-new urban dynamics and that the historical cities are the subject of new developments, and becoming modern architecture popular in historical fields and development of sensitivity faced on this, and changing the role of economy and cities is realized by tourism strategies in micro and macro scales, and becoming the uniqueness and integration concepts prominent for protection of living historical landscape and using buffer zone concept as a protection strategy and this recommendation was accepted by UNESCO General Committee on 10.02.2011. It is stated in the recommendation decision that urbanization rate causes socio-economic change and development in national and international level and this change should be integrated to the protection, administration and planning strategies of historical areas against the threat of disintegration or destruction of urban heritage, and the integration process can be executed by a holistic landscape approach and sustainability of urban identity can be achieved by this approach. In the decision, it is also reported that the cities which have growth motors become more important gradually as the innovation and creativity centers of cities and they provide opportunities for employment and education however they are subject to social and spatial disintegration by rapid and uncontrolled growth and they lose their environmental qualities and subsequently over-crowded, standard and monotonous buildings increase gradually by the loss of public areas, inadequate infrastructure, poverty and social dissociation and they reach the risk stage (URL 1, 2011).

In this context, the decision recommends a “landscape” approach considering the relationships between the physical forms within a wider urban context for the determination, protection and management of historical areas, spatial organizations and connections, natural characteristics and positions and social, cultural and economic values. This approach consists of politics, administrative and management subjects where various shareholders participate including local, national, regional and international public and private actors in the urban development process and develops the “holistic protection” approach. The responsibilities of the actors in the indicated holistic protection approach are;

- Integration of historical urban heritage protection strategies to national progress politics by the member states according to their historical urban landscape approach and preparation of their urban development plans in this framework,
- Achievement of collaboration of public and private sector actors by means of partnerships,
- Integration of historical urban landscape approach within their own strategies, plans and activities by national and international non-governmental organizations and international organizations and ensuring development and making popular of the correct applications (Dinçer, 2012).

Historical Urban Landscape (HUL) toolkits have been defined in the recommend-dation decision for adopting these principles and their integration to urban heritage protection approach. The HUL framework consists of four toolkits and the six-point action plan. Recommended toolkits to be developed include civic engagement tools, knowledge and planning tools, regulatory systems and financial tools using collaborative and participatory approaches that can be responsive to dynamic local settings. The six-point action plan outlines a framework for implementing (Buckley, et al, 2016)

Civic Engagement: In the recommendation decision of UNESCO, the HUL approach is defined as *"addresses the policy governance and management concerns involving a variety of stakeholders, including local, national and international public and private actors in the urban development process"* (URL 1, UNESCO, 2011). As the name implies, the significance of ensuring synergy of public-local-private-civil initiative is pointed out for the protection of urban heritage in the scope of the historical urban landscape approach. Furthermore, the full range of civic engagement tools is integral components of stewarding the historic urban landscape into the future (O'Donnell &Turner, 2016).

Knowledge and Planning Tools: As stated in the HUL document, *"Urban heritage, including its tangible and intangible components, constitutes a key resource in enhancing the livability of urban areas and fosters economic development and social cohesion in a changing global environment. As the future of humanity hinges on effective planning and management of resources, conservation ash becomes a strategy to achieve a balance between urban growth and quality of life on a sustainable basis."* (URL 1, UNESCO, 2011; O'Donnell &Turner, 2016). It is expressed in the recommendation decision that association of the traditional approaches with modern approaches is effective for the protection of urban heritage uniqueness against the 21st century urban problems.

Regulatory Systems: As stated in the HUL document, *"Regulatory systems should reflect the local conditions. And may include legislative and regulatory measures aimed at the conservation and management of the tangible and intangible attributes of the urban heritage, including their social, environmental and cultural values. Traditional and customary systems should be recognized and reinforced as necessary*" (URL 1, 2011).

Financial Tools: Financial tools should aim capacity development based on rooted traditions by supporting innovative endowment development. In addition to the global funds to be provided by governments and international organizations, financial tools must contribute to effective utilization of private investments in micro scale. In addition to partnerships, other flexible finances and micro credits that support local enterprises are crucial (O'Donnell &Turner, 2016).

Action plans for conveying local culture and cultural heritage to future generations without losing their unique values in the face of today's globalization dynamics have been determined in UNESCO General Conference, 36th Session. The action plan consists of the following matters;

- Undertaking comprehensive surveys and mapping of the city's natural, cultural and community resources.
- Reaching a reasonable degree of consensus, through the use of participatory and stakeholder consultations, regarding what cultural heritage values should be protected for inspiration and enjoyment of present generations as well as transmission to future ones, and determining the attributes that carry these values.
- Assessing the vulnerability of these attributes to socio-economic pressures and impacts of climate change.
- Integrating urban heritage values and their vulnerability status into a wider framework of city development, which shall provide indications of areas of heritage sensitivity that, require careful attention to planning, design and

implementation of development projects.

- Prioritizing policies and actions for conservation and development.
- Establishing the appropriate partnerships and local management frameworks for each of the identified projects for conservation and development, as well as to develop mechanisms for the coordination of the various activities between different public, private and civic actors (URL 1, 2011) (Buckley, et al, 2016).

This six-point Action Plan is considered to be the lowest common denominator, applicable in principle to the majority, if not all historic cities in the different geo-cultural regions of the World.

Table 1. HUL Approach Toolkits (according to O'Donnel and Turner)

HUL Approach Toolkits			
Civic Engagement Tools	**Knowledge and Planning Tools**	**Regulatory Systems**	**Financial Tools**
-Accessible, multiplatform urban planning vision process - Public forums about aspects of the urban future - Web based local heritage games - Urban heritage issues web exchange blogs, chat rooms - Planning charrettes with open dialogue -Documentation projects, oral interviews, videos -Community heritage stewardship skill development, workshops, projects - Volunteer efforts to sustain local historic places	-Holistic planning process that incorporates urban heritage & values - Documentation of tangible & intangible community heritage - Urban viewscape mapping for building envelope, height, location -Planning for conservation of natural & cultural resources - Targeted urban preservation, management, tourism plans - Green infrastructure knowledge applied with heritage considered - Plans incorporating heritage values to address streets, public facilities, storm-water, parks, etc.	- Zoning ordinance underpinned by urban heritage database - Conservation easement law - Historic district commission law - Traditional, customary systems, indigenous peoples - Legislated climate change targets - Tree protection ordinance - Green Infrastructure, Renewable Energy Codes - Multi-purpose overlay districts, for economy, heritage, aesthetics, conservation - Legislation specifically addressing urban heritage stewardship/management - Urban viewscape controls	- Private Public Partnership targeted funding for Urban Heritage - Public Capital Improvements - Ongoing Public Maintenance Staffing & Budgets - Private Building & Property Maintenance - Purchase Y Resale with Conservation Restrictions - Revolving Loan Fund addressing Historic Structures - Long-Term Lease of Heritage Properties - Mutual Covenants - Outright Purchase of Key Properties - Conservation Easements - Transfer of Development Rights - Donations of Heritage Property to Reliable Stewards - Funding for Urban Heritage Conservation Agencies - Grant Programs for Urban Intangible and Tangible Heritage Actions - Taxation Laws Favoring Preservation Investments

Historical urban landscape approach toolkits play an important role for ensuring spatial and temporal sustainability of urban heritage and identity of the settlement which it is a part of. These tools are defined as elements that need to be integrated in urban planning and shaping protection laws by directing the interventions and ensuring employment by promoting participation of the society in protection and thus contributing to regional economy.

HISTORICAL URBAN LANDSCAPE APPROACH AND APPLICATIONS IN TURKEY

International Regulations Turkey Subscribes to in the Scope of Historical Urban Landscape Protection

Historical environment protection cognizance has been on the agenda since 1960s. In the 1st Article of The Venice Charter with the constitution nature of historical environment protection concept at the international level and accepted in 1964 at the "2nd International Congress of Architects and Technicians of Historic Monuments" which Turkey is subscribed to, the statement is included as *"Historical monument concept does not only consist of an architectural artwork, it also encompasses an urban or rural settlement witnessing a certain civilization, a significant development and a historical event. This concept involves not only great artworks but also more simple artworks that have gained cultural purport within time"* (URL 2, 1964). Therefore, with this new view, the concept has become to consist of a section or entirety of urban settlements that have characteristics that need to be protected and also a rural settlement that has changed or slightly changed in terms of local architecture.

The "International Council of Monuments and Sites (ICOMOS) which was founded in 1965 is another significant international initiative that Turkey is a party of in historical environment protection matter and it has prepared a setting for forming a common language and level in historical environment protection studies with 107 members which included Turkey, and for international idea exchange by discussing protection principles and application every year in various meetings. In the conference and outcome proclamations issued by the Council, recommendations have been developed regarding protection, restoration and revival of historical environments and integration with the modern environment.

Reflection of the improved significance of historical environment protection in the scope of sustainable progress to the protection of cultural heritage has occurred by the Convention Concerning the Protection of the World Cultural and Natural Heritage was adopted by the General Conference of UNESCO on 16 November 1972. Turkey participated in this convention with the law 2658 dated 14.04.1982 and all participant countries have been held liable to take legal, scientific, administrative and financial measures appropriate to the protected area and to inform the council about these measures (URL 3, 1982). Following this agreement, an era was entered into where methods and strategies in protection applications can be monitored in the international area by the formation of World Heritage List in 1979.

In declaration of Amsterdam issued in 1975 by ICOMOS, it was accepted that European architecture heritage protection should play a more determinant role in urban country planning and it is an integral part of this planning. The European Council has emphasized in its European Charter of Architectural Heritage decisions that legal, financial and administrative measures should be taken for promoting protection (URL 4, 1975). In this declaration, which Turkey participated in 1989, it was emphasized that local administrations should envisage support of central governments and public participation in protection applications (URL 5, 1989) It also prescribes the determination of techniques and methods that are required for integral protection policies and training masters to do the applications. The same approach was brought into the agenda and discussed in UNESCO meeting held in 1976 in Nairobi and at the end of the meeting decisions were made as “Recommendation concerning the Safeguarding and Contemporary Role of Historic Areas” (URL 6, 1976).

In the “European Landscape Convention” accepted in 2000 by the European Council, landscape concept was defined as “a resource for economic activities in the base of sustainable progress, a representative of local culture, a component improving life quality of people both in urban and rural areas, and a living entity directly affected by transitions experienced in the socio-economic and demographic structure of society”. According to this definition, landscape entities are included in the cultural heritage scope. In the scope of protection and management of landscape, Turkey became a party to Convention on Biological Diversity in 1997 and The Cartagena Protocol on Biosafety in 2003 (URL 7, 2003).

“Text of the Convention for the Safeguarding of the Intangible Cultural Heritage” was issued by ICOMOS in 2003 and became a domestic law document in Turkey in 2006 and it was organized for the relevant communities, groups and individuals to protect nontangible cultural heritage, and in this scope, to improve sensitivity in the national and international level and to ensure mutual appreciation and international collaboration and contribution (URL 8, 2003) (URL 9, 2006).

The significance of participation of the society attracted attention in the process until the application and monitoring stages of the protection studies in the definition of cultural heritage in the “ Council of Europe Framework Convention on the Value of Cultural Heritage for Society” signed by the European Council member states and where Turkey participated in 2005. In this convention, a process is defined where the local people are effective directly instead of a committee made of expert staff for the definition of cultural entities differing from the previous legislative regulations.

Main principles are defined for the comprehension and presentation of cultural heritage in the “ICOMOS Charter on the Interpretation and Presentation of Cultural Heritage Sites” signed in 2008 (URL 10, 2008). The significance of accurate comprehension by the public and pass on to the public has been addressed for the success of the protection. It is stated in the concerned covenant that people participation is an integral part of the process and the communication channels must be used efficiently to improve the participation level.

Life quality concept in historical environments is addressed for the first time in the text titled “Valetta Principles for the Safeguarding and Management of Historic Cities, Towns and Urban Areas” in 2011 in the scope of historical environment protection (URL 11, 2011). In this context, concepts such as transition area, management plan, protected urban area and area spirit have become prominent, the necessity for keeping the socio-economic structure of historic fabric, the significance of controlling of gentrification process in the area for sustainability of protection and the necessity of protection of area spirit during protection studies have been specified.

“Site Management” concept came to the agenda in 1977 however it gained operability in application in 2013 by the “The Operational Guidelines for the Implementation of the World Heritage Convention” and it has become important for the sustainable protection of world heritage areas especially (URL 12, 2013). In the operational guide, the significance of the management plan stands out by imposing the obligation to have a management plan for World Heritage Areas.

Turkey has signed all of these international covenants and proclamations and hence Turkey is a party in the reached decisions like other western countries.

National Regulations for the Protection of Historical Urban Landscapes

Contemporary protection cognizance applications in historic environment protections activities in Turkey have gained importance after the recognition of Venice Charter in 1964. New definitions and limitations have been introduced to the matter of protected values, and protection in the area scale switched from the single structure scale by the Ancient Monuments Code with the effects of Venice Charter

Following the recognition of UNESCO World Heritage Convention in 1982, Code of Protection of Cultural and Natural Assets took effect in 1983 and in the same year, “Immovable Cultural and Natural Assets Regional Commissions” and “High Commission of Immovable Cultural and Natural Assets Protection” was founded in place of the “Commission of Real Estate Ancient Artworks and Monuments”, and application and supervision mechanisms were formed in the scope of historical environment protection.

Amendments were made in 2863 Cultural and Natural Assets Protection Law upon the strengthening of existing organizational structure in environmental protection matter and tailoring the legal system to international norms in 2004 (URL 13, 2004). The necessity for planning was indicated and the management plan concept was emphasized by announcing management areas in historical environment protection. Furthermore, transfer of financial resources to maintenance and repair of cultural assets and budget formation was decided by the law.

The scopes and management process of historical environment protection project and applications were specified by the “Law on Renovation, Protection, Keeping Alive and Using of Aged Historical and Cultural Immovable Assets “ and the “Regulation on the Procedures and Principles for the Determination of Foundation and Duties and Management Areas of the Committee of Ancient Monuments by Area Management” dated 2005 envisaging the announcement of renovation regions with the decree of the Cabinet in regions that are declared as sit areas by Law 5366 dated 2005 (URL 14, 2005).

It was decided to establish “protection, application and supervision bureaus” to execute the processes and applications concerning cultural assets within the metropolitan municipalities and governorship to ensure supervision of the projects and applications that were developed for the protection of historical urban landscape by Law 2863 on the Protection of Cultural and Natural Assets (URL 15, 2005).

In the context of protection of historical urban landscapes in Turkey, the Association of Historical Cities is a member of European Association of Historical Cities and is based on the fact that the historical environment concept, which is determined by the laws and regulations included in the national legislation based on international covenants and proclamations which Turkey is subscribed to, will be effective by integrated protection policies based on local-civil-private collaboration not only on by public establishments, and it plays an effective role in Turkey in the scope of protection of cultural heritage.

The Association of Historical Cities was established with the Cabinet Decree numbered 2000/1203 issued in the official gazette dated September 28, 2000 and numbered 24184 and it is a legal entity in the scope of 5355 Local Administrative

Unions Law and its duty areas and activities cover the member municipalities of the Association. The Association aims to protect and introduce historical, cultural and natural texture of cities by bringing professional and non-governmental organizations together with local administrations and the vision of protecting historical, cultural and natural texture of Turkey and to transmit them to future generations and the number of the member municipalities is 412 (URL 16, 2000).

Historical Environment Protection and Renewal Projects in the Scope of Historical Urban Landscape Approach

In this section of the research, the projects and applications of local administrations are discussed which has a crucial role in the scope of historical urban landscape approach, based on the assessment of historical landscapes together with local and regional landscape values. The contests of "*Encouraging Projects and Practices of Protecting Historical Cultural Heritage"* are scrutinized which has been continuing since 2002 with the purpose of promoting cultural heritage protection studies among the member municipalities of the Association of Historical Cities (AHC) in the framework of applications made in the scope of historical environment protection in Turkey, and revealing historical urban landscape protection approaches of local administrations of Anatolian cities located in different geographical regions of Turkey is aimed.

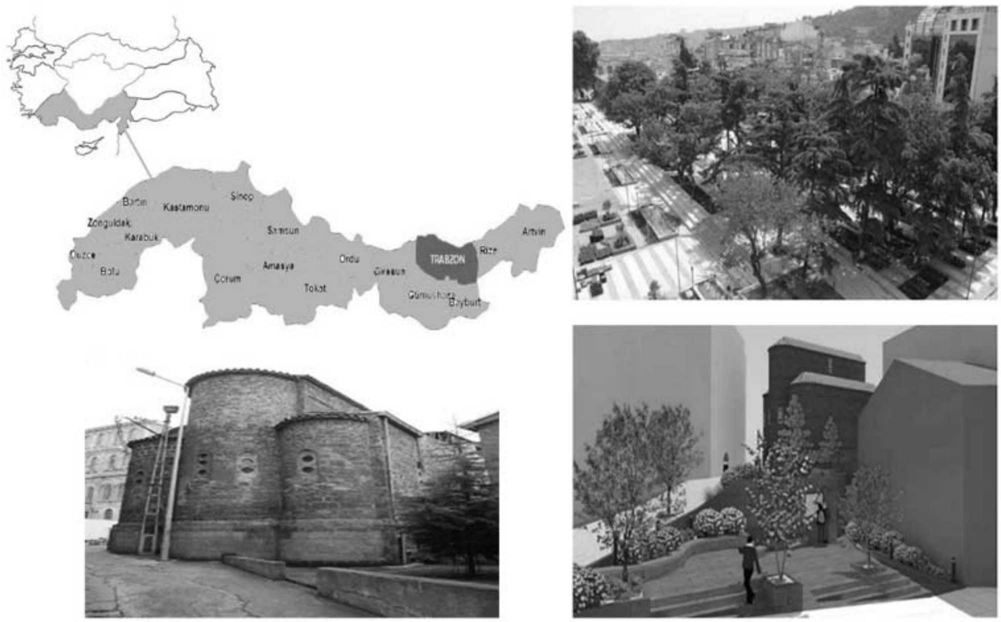

Figure 1. St. Anna Church and its environs landscape design project (TKB & ÇEKÜL, 2011)

The Black Sea Region (Trabzon Municipality): Small Ayvasıl (St. Anna) Church Landscape Project, Square Park and its Environs Urban Design Project

Ayvasil Church is the smallest church founded in Trabzon city located in the

Eastern Black Sea Region of Turkey and today it is located in the busiest region of the city and is the only religious structure not turned into a mosque after the conquest in 1461. The Ministry of Culture has the ownership of the structure which was renovated in 1999 and it is aimed to be opened for visits following the completion of Small Ayvasil Church Landscaping project. The project was formed by the collaboration of the Municipality, Ministry, provincial organization and Foundations Regional Directorship. Utilization of equities of the municipality is planned during the project execution (Figure 1). The Square Park and its Environs Urban Design project has been planned in three stages in the trade center of the city, and solution of heavy traffic is programmed in the first stage, subsequently formation of a city square is programmed and functioning of the historical buildings in the area is programmed in the last stage. The project, displaying a holistic cognizance, was executed by a provincial design team made of different disciplines. Universities and non-governmental organizations were included in the process and the public demands were taken into account. The municipality equities and Prime Ministry Promotion Fund were used in the project. A Certificate of Achievement was received from Trabzon Municipality AHC for this project (TKB &ÇEKÜL, 2011).

Central Anatolia Region (Konya Municipality): Kılıçarslan II Pavilion Archeological Excavation Area and Urban Design Project

Konya Metropolitan Municipality was rewarded with 2014 “Protection Grand Prize” for the project, which was able to create a recreational area with high public characteristic in the center of the city as the archeological sit area is protected, on Alaeddin Hill in Konya city, which is crucial for the history and identity of Anatolia, reflecting the local identity of the area with its cultural value and unique architecture and presenting an urban design recommendation, and with the solution of green field and open air museum in harmony. The project, remarkable for high characteristic of architectural and urban design recommendations, encompasses the arrangement of the archeological sit area, which is situated on Konya Alaeddin Hill and consists of findings belonging to Roma, Seljuk and Ottoman eras, and the suspension and protection of II. Kılıçarslan Pavilion ruins that is located in the same area (Fig. 2).

The project aims to make the archeological sit area, which is situated on Alaeddin Hill, a cultural focus point in the center of Konya. In this context, the excavation field has been arranged as an open air museum that is easily toured with platforms, observation points and display areas. In addition, it is suggested in the project scope that Kılıçarslan II Pavilion is supported with steel construction for protection purposes and suspended and integrated with the archeological field. The design principle of the project is the association of architectural components with each other, which directed the project in different points of the field, and the protections and assessment of these components. In addition to the significance of the structures in Anatolian Seljuk Architecture, the protection-usage relationship of the field with the city and urban identity has directed the design.

The planning for the revival of Kılıçarslan II Pavilion ruins and protection of archeological excavation field has been made based on protection-utilization principles. The design for the protection and revival of Kılıçarslan II Pavilion has been planned based on methods not to harm the existing pavilion ruins (TKB & ÇEKÜL, 2014)

The purpose of the project is the revival of the main body of the pavilion with its mass and symbolic dimensions on the glass base/cover defined as the old balcony platform based on the protection principles, and based on the data and documents seen in the photographs from 1900s staying away from hypothetical decisions and avoiding adornment details. The revival was frozen in 1897. Material definition was not made in the revival and the surface effect was defined based on the model concept. It's formation has been planned on the façade surface based on the geometrical motifs to be made on the northern wall of the pavilion and F. Sarre's drawing and without any writing, color and material difference by the embossed stucco method.

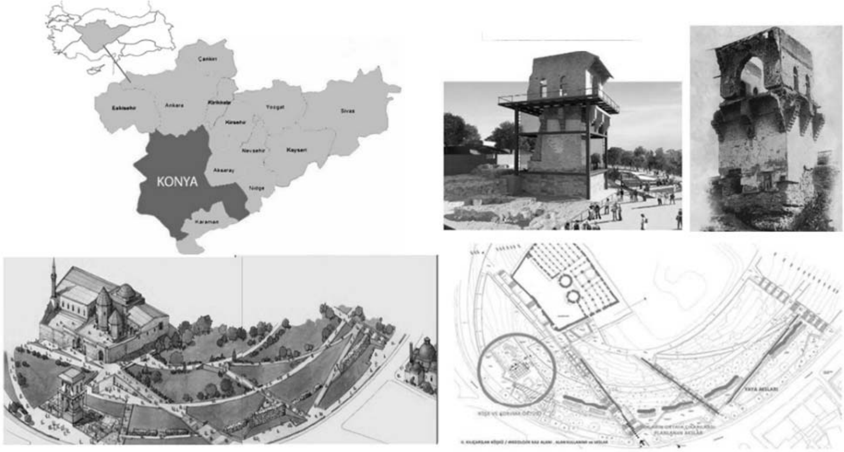

Figure 2. Kılıçarslan II Pavilion, its position and characterization in the lay out plan Archeological Excavation Field Landscape Design Project, (TKB &ÇEKÜL, 2014)

Structural pieces and rampart walls belonging to Roma, Seljuk and Ottoman eras were revealed in excavations made in the fields at the east and west sides of Kılıçarslan II Pavilion. The archeological ruins were assessed together with the pavilion. The surface of the archeological excavation field was covered with ambulatory glass laying and protected, and formation of a setting for observation of archeological ruins has been planned. Assessment of the pavilion and archeological ruins as a cultural area in the center of Konya and formation of an informing setting is a part of the planning. Ensuring transportation by pedestrian platforms and stairs has been planned by assessing Alaeddin Hill as a cultural area in the center of Konya and by using the natural topography of the hill in the design of the pedestrian roads and squares that are to be constructed in the natural texture.

South Eastern Anatolian Region (Şanlıurfa Municipality): Halepli Garden - Kızılkoyun Assessment Project, Samsat City Circle - Karakoyun Creek Urban Design Project

Sanliurfa Municipality was awarded by a "Project Prize" in 2012 for two projects ensuring the protection of the caves, which are a significant part of the historical identity of Şanlıurfa City, and turning them into a recreational field and definition of an important public axis which includes an archeo-park in the city, and connecting the symbolic structures of the city identity around a circle and arranging the brows of a stream, which was neglected for years, as a public area . The project field encompasses an axis laying from Balıklı Lake, which is a urban attraction center within the historical texture of Urfa, to Bediüzzaman Graveyard, and in this sense, it connects the two historical focuses of the city to each other. Kızılkoyun Crests is an area with one of its sections ruined, and consists of approximately five hundred structures most of which are unqualified. 70 caves, most of which remain under the structures, are located in this field (Fig. 3). These caves have been made functional for recreational purposes with this project and connected with each other by platforms and observation terraces (TKB & ÇEKÜL, 2012).

Figure 3. Halepli Garden - Kızılkoyun Assessment Project, Samsat City Circle - Karakoyun Creek Urban Design Project (TKB &ÇEKÜL, 2012)

Figure 4. The caves situated at Kızılkoyun Brows (TKB &ÇEKÜL, 2012)

It creates a central axis for pedestrian usage by forming a relationship with the archeological park area. The project has been supported by the exhibition and meeting areas as well. The project aims to form a public area at Samsat City Circle and by the stream and on the other hand, it aims to reorganize the brows of Karakoyun Creek which was neglected for many years. Structures that are important for city identity including Liberation Museum, Millet Hostelry, Justinian Aqueduct and historical Millet Bridge are connected with each other with the city circle, and Samsat City Circle has become an important focus. Moreover, clearing of the brows of Karakoyun Stream, which hosts many important historical bridges, and opening them for recreation-purposes has been recommended (TKB &ÇEKÜL, 2012).

Aegean Region (Konak Municipality (Izmir))- Altınpark Archeological Field Protection Structure Project and Tekel Tobacco Warehouse Restoration

Konak Municipality was awarded with a “Project Prize” in 2013 by AHC for an archeological landscape arrangement aiming to protect and exhibit archeological excavation findings revealing a different layer belonging to the history of Izmir City, and for gaining the city an industrial heritage of National Architectural period with the collaboration of a public organization. The historical environment renewal project consists of two stages.

Altınpark Archeological Site Protective Roof and Environs Arrangement Project: The project aims to protect and exhibit artworks belonging to Roma and Byzantium periods uncovered as a result of excavations that lasted for five years in Konak County of Izmir City. The structure to protect the archeological findings from external factors is made of three sections and consists of the stage of spatial arrangements ensuring an exhibition opportunity and the stage of environmental arrangement. The excavation field is protected by the recommended modern design and at the same time it is aimed that it is turned into a new recreation area with its environs within the city and it is included in the social life of the city (Figure 5).

Figure 5. Altınpark Archeological Field Protection Structure Project (TKB &ÇEKÜL, 2013)

Tekel Tobacco Warehouse Restoration: It was aimed to gain the registered industrial structure to the city culture which was constructed in Konak Municipality Basmane District in 1931 as Tekel Tobacco Maintenance Warehouse and belonging to the 1st National Architectural period (Fig. 6). Strengthening of the worn-out historical structure by the restoration application and repair and protection of the unique architectural components has been determined as principles and interventions for the function have been made. The structure is planned to be used as Izmir Police Headquarters Service Building.

Figure 6. Tekel Tobacco Warehouse Restoration (Western View 1/50) (TKB &ÇEKÜL, 2013)

Marmara Region (Tekirdağ Metropolitan Municipality): Historical City Center and District Revival Projects, and 2 Single Structure and 11 Water Fountain Restoration Projects by Covered Bazaar Environs Landscaping

Tekirdağ Municipality was awarded by a Project Prize in 2013 for contributing city's life quality by forming modern public areas aiming perception of the historical heritage of the city and city identity by important restoration and landscaping in the neglected regions of the city. The project was recommended by Tekirdağ Metropolitan Municipality and consists of city center revival, district revival, covered bazaar landscaping and structure and water fountain restoration stages (Fig. 7) (TKB & ÇEKÜL, 2013).

Historical City Center Revival Project: A new public field has been gained to the city by clearing the surroundings of the historical city center and historical structure and with quality urban design applications and new recreation areas have been formed in the focus of the city by emphasizing historical center lines.

Turgut District Revival Project: The historical texture is intense in the study field which consists of abandoned storage structures and building behind the port, and the open areas in the study field were handled with designs supporting the street life and a new center has been established with historical structures which have culture and trade-focused functions.

Ertuğrul District Revival Project: It has been aimed to establish a new center for tourism with housing, accommodation, social service and sale structures with the revival project of a problematic city part which reflects the historical street texture of the city and where registered civil architectural examples are intense.

Rüstem Pasha Covered Bazaar Landscape Project: Trade and recreational area formation supporting pedestrian usage has been aimed by clearing unqualified structures around the bazaar which has a significant value in the city identity of Tekirdağ.

Restoration projects: Namık Kemal Monument and Abide-i Hürriyet Water Fountain in the garden of Old Municipality Building, which is a masonry structure with neoclassical style and 11 water fountains reflecting the 18^{th} and 19^{th} century Ottoman architecture have been aimed to be restored in the project scope.

Mediterranean Region (Yüreğir Municipality) –Eternity City Missis Project: Yüreğir Municipality was rewarded with a Project Prize in 2013 in a contest arranged by AHC for a project consisting of a housing program supporting Missis Antique City the excavation studies in Adana city and encompassing protection-focused application throughout the city and for the local people to benefit from social and urban services. Missis Antique City is located within Yüreğir County limits in Adana in a region where there is a shanty settlement and its history goes back to the Neolithic era.

With the recommended urban protection-focused development strategy, solution recommendations have been presented to remove limitations hindering the excavation studies and to ensure local economic revival by improving tourism potential of the city (Fig. 8). In this context, social transition targets have been determined consisting of moving of the residents of illegal settlements to new housing areas appropriate to agricultural production. Opening of the area for the excavation studies, erection of structures including acropolis, theatres and a stadium, turning Havraniye Hostel into a cultural center and restoration of Ottoman and Seljuk artworks in the county are included in the project scope. The studies are being conducted with the collaboration of the Ministry of Culture and Tourism, Ministry of Environment and Urban Planning, Ministry of Agriculture and Stockbreeding, Ministry of Finance and Adana Governorship.

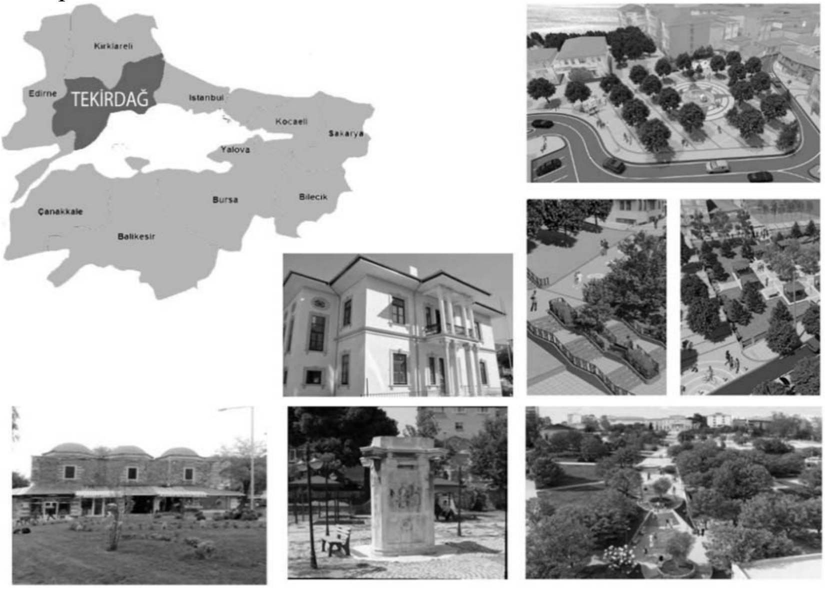

Figure 7. Historical City Center and District Revival Projects, and 2 Single Structures and 11 Water Fountain Restoration Projects with Bazaar Landscaping (TKB &ÇEKÜL, 2013)

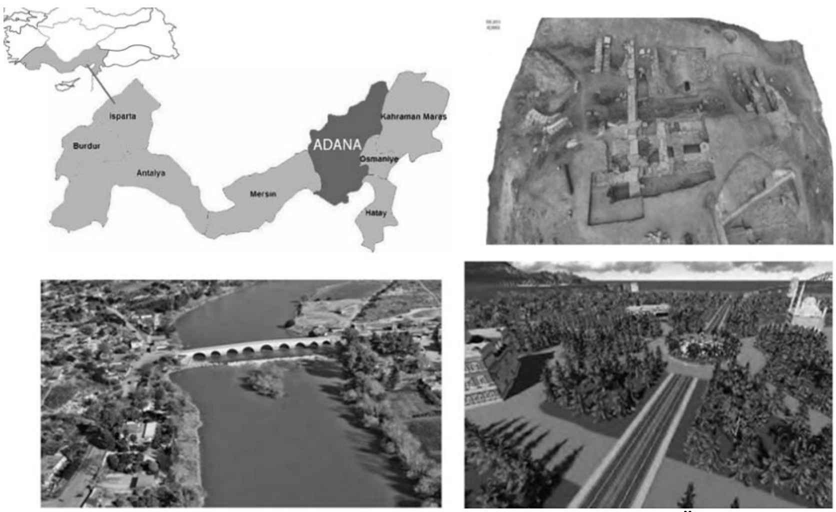

Figure 8. Eternity City Missis Antique City (TKB &ÇEKÜL, 2013)

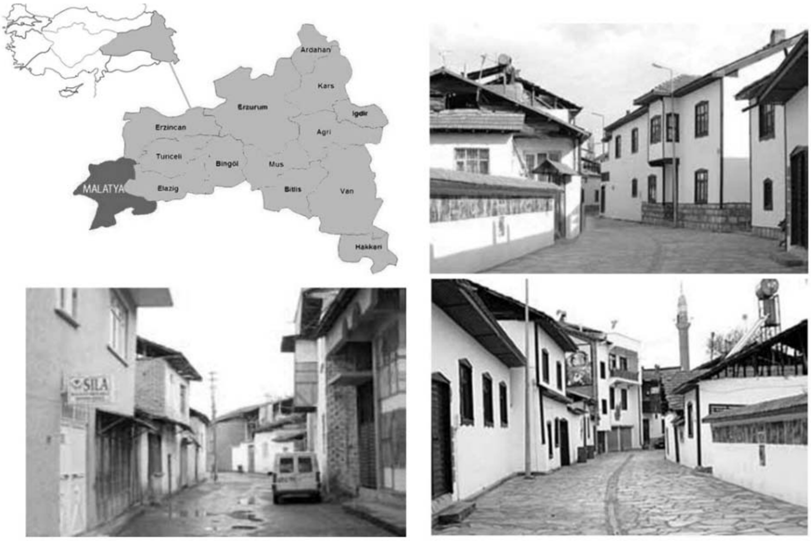

Figure 9. Before and after Çukurpinar Street improvement application (TKB &ÇEKÜL, 2010)

Eastern Anatolia Region (Malatya Battalgazi Municipality): Çukurpınar Street Improvement Application

The improvement application was carried out on Çukurpinar Street located within the urban sit area in Battalgazi County, which is known as "Old Malatya" within Malatya city limits in the Eastern Anatolia Region of Turkey, based on the zoning plan recommendations and decisions with a protection purpose.

Restoration of numerous traditional housing have been made in the scope of Çukurpinar Street improvement project which is surrounded by rampart structures belonging to Roma period and where housing utilization is common, and infrastructure systems and road hard ground laying have been renewed (Fig. 9). It was rewarded with "Protection Grand Prize" in 2010 for the strengthening of the city texture application which was carried out with the collaboration of the District Governorship and Battalgazi Municipality for valuing the urban protection and contributing to city culture despite of the budget and equipment inadequacy.

CONCLUSION

In this research, the protection strategies of the concerned local administrations have been revealed in the scope of the protection-renewal studies carried out in Anatolian cities which have different cultural layers and thus a variety of cultural heritage. The significance of developing a dialogue between institutions and formation of joint study awareness is seen for ensuring sustainability of protection of historical city textures and for reaching modern life standards in the scope of the examined historical environment renewal projects. Scientific reliability of the projects is improved, which form as a result of the meeting of the union that plays an effective role for the protection of historical cities in international scale and the resources and authorities of the local administrations in this framework and taking responsibility for sustainable protection especially. At the same time, it is thought that joint study culture will prevent incorrect and destructive applications in protection by the training and raising awareness of the concerned personnel of the local administrations who play an effective role in culture protection.

Financial resource inadequacy stands out when the historical environment renewal project applications and legal arrangements made in Turkey are studied, in protection and renewal studies and protection and making functional of historical places that are situated in settlements that became the subject of the development policies in the national and international scale in the framework of the studied examples. Improvement of financial tools (as specified in the recommendation decision of UNESCO) by the administration of national financial resources, global funds, private investments, contributions and aids based on project and project cycle approaches that are accepted in the international organizations is crucial in the scope of the protection and integration to the modern environment of historical urban landscaping. On the other hand, development of decisions for providing local employment and support of local enterprises by financial tools in the examined projects is in accord with the recommendation decision.

The threat of uncontrolled structuring as parallel to the growth of population movements has become an important problem in Turkey like in other developing countries today. Especially historical environments which have cultural values however turned into collapsed areas become an unearned income for the real estate sector and lose their identity. In the face of this distress, the protection concept must be consolidated based on an organization between sectors including the local people, the historical landscaping must be included in the city planning decisions according to the urban design principles, and the structuring conditions to be applied in these areas especially must be tackled in an organization to protect historical cultural entities from the structuring pressure, and popularization of the culture of collaboration with institutional mechanisms must be ensured for the protection, supervision and control of historical environments.

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Chapter 17

Analysis Temporal Land Use/Land Cover Change Based on Landscape Pattern and Dynamic Metrics in Protected Mary Valley, Trabzon from 1987 to 2015

Sara DEMİR*, Öner DEMİREL**

INTRODUCTION

Rapid population growth, technological progress, industrialization, unconscious and unplanned consumption of natural and cultural resource values cause to climate changes, disasters for deterioration of the natural balance of landscapes, and thus landscape can change over the time. The recognition of these changes on the international scale brought on the agenda. In the beginning of 20th century, dramatic urban transformation, urban growth, increasing human need and environmental problems started to adversely pressure on watershed area, ecologically sensitive protected area and rural areas located in surrounding urban areas. Thus, the need for monitoring and analysis the temporal and spatial changes of natural and cultural areas and providing sustainable development of them have became essential concerns in the last few decades (Lausch & Herzog, 2002; Martinuzzi et al., 2015). In this case, the studies and research projects of landscape changes have increased rapidly with technological development (Braimoh, 2006; Mairota et al., 2013).

Land use and land cover (LULC) changes is important key to determine landscape change over the time and an interest topic for ecosystem research (Braimoh, 2006; Futiérrez & Grau, 2014). LULC changes have been known as a major key driver of global landscape change and generate the relationship between humans and surrounding land use (Fichera, Modica & Pollino, 2012; Futiérrez & Grau, 2014) LULC changes in landscape pattern are related to socioeconomic, political and technological valuables (Turner et al., 2001; Tian et al., 2014). Besides, LULC has changed due to natural and cultural forces such as flooding, all erosion types, landslide, loss the biodiversity and wildlife habitat, environmental pollution, smuggling, population migration and expansion road and other infrastructure (Braimoh, 2006; Ghosh, Munshi, Areendran & Joshi, 2012) .These changes have major influence for physical and human landscape because each LULC type has different environmental properties and anthropogenic uses. In this case, monitoring and understanding of LULC changes are effective way to assess landscape mechanism system and ecological process, provide ecological and cultural sustainability, generate the prediction of future change on landscape pattern and mitigate the undesirable effects on landscape resources (Braimoh, 2006; Fichera et al., 2012)

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The interaction of natural and cultural landscape resources is determined in the context of landscape ecology with the purpose of evaluation the pressures that shape and change the landscape (Leitão & Ahern, 2002; Forman, 1995; Turner & Gardner, 1991; Turner, 1989; Forman & Godron, 1986). The differentiations occurring in the landscape pattern during the time depth can be determined in the landscape character analysis process (Görmüş, 2012; Deniz, Küçükerbaş & Esbah, 2006; Ahern et al., 2002). This change affects the structure and function of the landscape. Since a small change in the landscape function or a small change of one parameter in the landscape structure can cause to change the entire landscape (Bastian, 2000; Treweek, 1999; Dramstad, 1996). Examination of the changes occurring in the landscape structure from the past to present with a holistic approach will contribute to the formation of healthy landscape planning strategies and sectoral guidelines.

Landscape metrics are used to detect the habitat function of each LULC type based on number, size, density, edge and shape of patches. These metrics are used to understand and analyze the landscape structure and composition at the patch, class and landscape level (McGarigal and Marks 1995; Lausch & Herzog, 2002; Seto & Fragkias, 2005; McGarigal, Cushman & Ene, 2012). Thus, the proportion, aggregation of land cover class, and the size, number, dispersion of each land cover patch, complexity, contiguity, proximity and connectivity of land cover shape, and diversity, evenness of overall landscape are defined for the landscape structure and interpret for understanding landscape habitat function (Turner et al., 2001; Malaviya, Munsi, Oinam, & Joshi, 2010; Mairota et al., 2013). Landscape structure metrics of landscape ecology studies ensure to understand ecological process with landscape heterogeneity, fragmentation and fragility (Gökyer, 2013; Ghosh et al., 2012). These metrics put forward the distribution of landscape disturbance and sustainable landscape development. It helps to successfully explain the landscape pattern (landscape dynamics). Hence, understanding the dynamic of landscape is useful for biodiversity and habitat analysis (Ghosh et al., 2012). Moreover, it is associated with landscape function and landscape change (Seto & Fragkias, 2005).LULC changes integrated with landscape metrics can effectively use for landscape planning and management (Esbah, Deniz, Kara & Kesgin 2010, Malaviya et al., 2010).

The technological development of remote sensing and geographic information system plays valuable role to monitor the relationship between landscape pattern and the forces causing spatial and temporal forces (McGarigal and Marks 1995). Therefore, it can be possible to detect efficiently the changes of LULC and habitant function and generate useful information for land use researcher, landscape and urban planner, decisions maker and policy maker. Additionally, these technologies can be used to determine landscape structure, LULC composition and also assess ecological integrity (Lausch and Herzog, 2002; Fichera et al., 2012). Although the studies with integrated remote sensing and geographic information system technologies have been used since the end of 1970s, monitoring and analyzing the changes of LULC changes and landscape structure have gained attraction in Turkey in recent years (Kara, Esbah & Deniz 2013; Bozkaya, Balcik, Goksel & Esbah, 2015).

Protected areas are surrounded by sensitive ecosystem. The LULC changes reveal serious threat for the native biodiversity, hosting many unique and rare endemic plant and animal species in the watershed areas. There are great interest in landscape ecology to determine the effects of landscape metrics on species of plants and animal distribution (Turner et al., 2001; Westphal, Field, Tyre, Paton & Possingham, 2003). Therefore, it is important to analyze the loss and gain of habitat (Westphal et al.,2003). Furthermore, these protected areas preserve their biological diversity and unsustainable land use might damage and decrease their conservation values (Martinuzzi et al., 2015). They cannot assess and isolate separately from their surrounding landscape (Esbah et al., 2010; Martinuzzi et al., 2015) because ecological process drive an integrated system and it is not limited by administrative boundary. Thus the boundary of protected areas is not sufficient for protection all landscape values (Demir et al., 2015). In this fact, Altındere Valley National Park assessed by its surrounding Mary Valley watershed area. The study area located in Maçka district in Trabzon city, Turkey. Due to under protect of ecological and cultural resources, Mary Valley has national and international attraction for tourism. Especially historical Sumela (Mary) Monastery with religion values are visited each year by orthodoxy catholic around the world. Though it has many attractions depending on ecological, cultural resources and tourism, the human population trend of the study area fell about 25% from 1987 to 2015 due to migration to urban areas (TURKSTAT, 2016). This research is based on the temporal land use and habitat changes in the protected areas. This study aims to analyze landscape and habitat change by change detection and landscape pattern and dynamic metrics to provide ecological integrity for the case study of Marry Valley, Trabzon, Turkey. . More specifically the objective is to determine LULC and monitor temporal and spatial changes of LULC through transition analysis (1), analyze landscape pattern and dynamics and determine habitat function through landscape structure metric analysis (2). Consequently, the methods and finding of this research can set guidance for the protected areas of Turkey and other countries of the world to mitigate adverse affects on sensitive landscape.

This study were carried out the stages included the spatial data collection, classification and determination of landscape structure metrics through landscape ecology. In this context, land cover types of Mary watershed were classified and the change of each type was determined by over time. Thus, the determination of changes in the study area that came from the past to present was ensured. By assessing the data obtained, the LULC of the study area was revealed, and the landscape change in the study area was defined within the scope of landscape ecology.

Literature Review

Many investigations about determining the landscape changes, defining, protecting, planning and managing landscapes have been carried out at the national and international levels. These researches have ensured the easier and faster examination of complex and changing landscapes depending on the development of technologies such as Remote Sensing (RS) and Geographic Information System (GIS). In this research, RS and GIS were used within the scope of the historical landscape assessment and the landscape character analysis and assessment methods.These tecnological development enable to monitoring and analyzing of ecological changes in the landscape structure, the classification of landscape character types and areas and performing the landscape analyses with different variables (Esbah, 2009; Jellema, 2009; Washer, Soba & Müncher, 2006; Swanwick, 2002). Furthermore, a common database with offering updating data creates for determined each landscape character area.

According to European Landscape Convention (ELC), each country should identify the landscape changes of whole country (Şahin et al., 2013; Görmüş, 2012; Uzun et al., 2007). On this context, the change of landscapes has been identified based on landscape ecology in many studies. The significant portion of landscape ecology studies has the feature of analyzing and monitoring the change in the landscape (Wu & Hobbs, 2007; Turner, 1989). Moreover, human activities have been accepted as a part of the ecosystem. Therefore, the planning and management applications bases on the human ecosystem. The landscape has been recognized as the basic unit of landscape ecology studies (Farina, 2010; Leitão & Ahern, 2002; Liu & Taylor, 2002; Forman, 1995). In this context, landscape ecology uses three landscape characteristics including landscape structure, landscape function, and landscape change. It defines the landscape change according to ecological changes in the structure and function of landscape (Görmüş, 2012; Deniz et al., 2006; Uzun 2003; Forman & Godron, 1986). In this context, the landscape structure consists of patch-corridor-matrix calculated by landscape structure metric (McGarigal, Tagil & Cushman, 2009; Leitão et al, 2006; Ahern et al., 2002; Turner et al., 2001). Frohn (1997) indicated that these metrics determining the landscape changes can be measured quantitatively through RS and GIS. Esbah (2009) revealed the change in the urban landscape in Aydın quantitatively and spatially by associating with GIS. Uzun (2003) determined the landscape fragility (sensitivity) in the river watershed by developing a landscape ecology-based management model in the watershed scale in Düzce and took fragility values into account in planning decisions.

It is possible to create more holistic, comprehensive, understandable landscapes by integrating LULC change analysis and landscape structure metrics analysis methods. The effects of the changes in the past can be analyzed and monitored on the modern environment. Thus, the interaction between natural forces and socio-economic forces (human actions) is determined (Fairclough, 2014; Ede & Darlington, 2002). The results of the temporal and spatial LULC transition analysis and habitat function studies constitute the guide for alternative future landscape planning studies.

Study Area

Mary Valley, located in Trabzon province, Maçka District, north east of Black sea region of Turkey, lies in a watershed area that is approximately 7802 ha (Figure 1). This study area is a rural area and characterized by 6 traditional villages and plateau settlements on the steep and deep valley with the rich natural, cultural and historical landscape values. Therefore, Mary Valley is one of the most important international and national protected areas and tourism destinations of Turkey. The 4468 ha of the study area was declared Altindere National Park in 1987 by the Ministry of the Forestry and Water of Turkey.

The elevation is changed between 480 meter (m) and 2718 meter. It leads to shaping the topography, different climate and vegetation types. Thus, this study are included different kinds of ecosystems with riparian buffer, density broadleaf forest (1350m -1750m), needle leaf forest (1750m-2000m), alpine meadows (2000 m and higher), rich and rare biodiversity with mammal, reptiles, amphibians and bird species (Gülez, 1984). Besides, it is natural landscape values; Mary Valley has archaeologically and historically important cultural landscape values. The historical Sumela Monastery was built above the forest on the steep rocks in A.D. 4th century and used as a route of the monks and pigrims for religious ceremonies by Christian Orthodoxy (Demir et al, 2015; Doğanay , 2011; Zaman; 2010). Many tourist around the world visit this monastrery every year (AVNP, 2015).

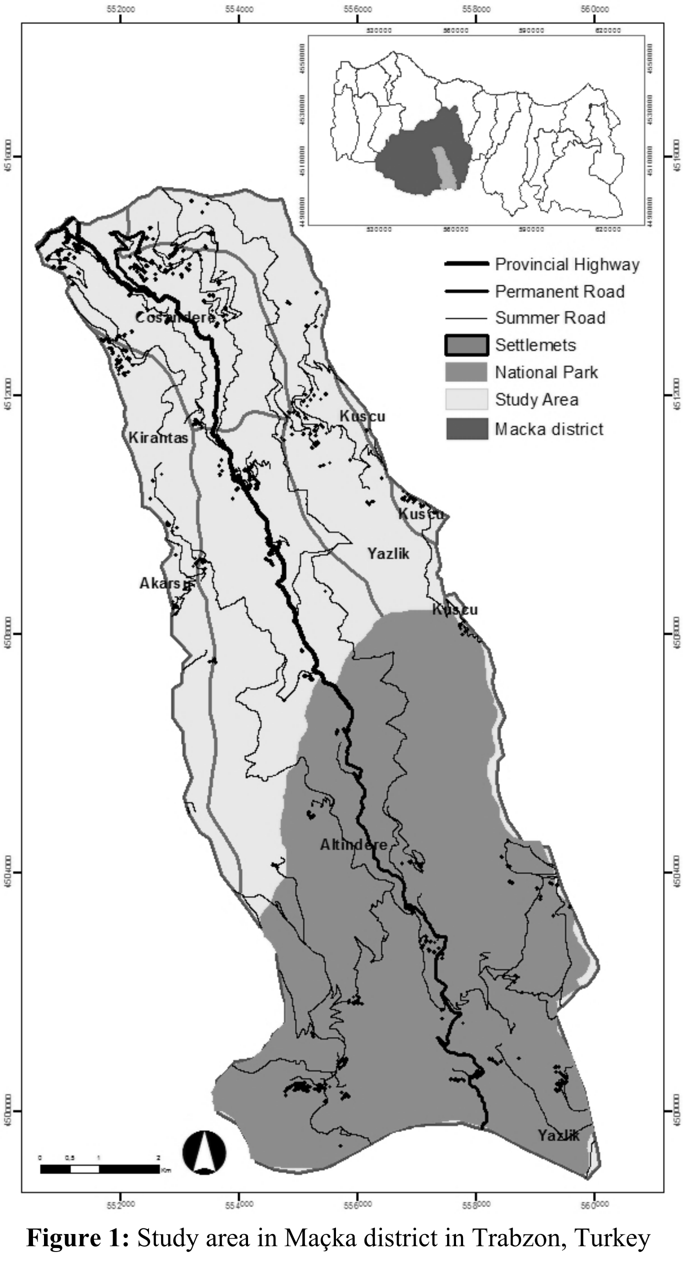

Figure 1: Study area in Maçka district in Trabzon, Turkey

The traditional life style with plateu settlements by made of wood or stone, traditional agriculture, home-made products, stockbreeding, handicrafts and summer festivals have countinued in this area. The current land cover types of the study area are forest, shrub, grassland, cropland, bareland and settlements. Because of the sensitive and unique natural and cultural landscape values, Mary Valley has been taken under different conservation status from 1972 to 1998 (Figure 2). The main economic activities are tourism, agriculture, forestry and livestock breeding. Nevertheless, tourism has supplied more income to local people due to strong climate condition, it is limited between July and September. The forestry and agricultural activities are limited in the national park. Both reasons has caused the local population migration to big the cities. Hence, the population of study area fell from 4142 to 1602 people between 1987 to 2015 (TURKSTAT, 2016).

The study area has been under serious problems such as lack of administrative support, lack of updated development strategies of the national park and unstable conservation status, hydroelectric power plant and building new ski run projects, new road building, discharge of sewage water to river, directly or indirectly damaged by local people, uncontrolled recreation and tourism activities, smuggling, destruction of Sumela and other ancient cultural values cause to deteriorate the landscape values of Mary Valley.

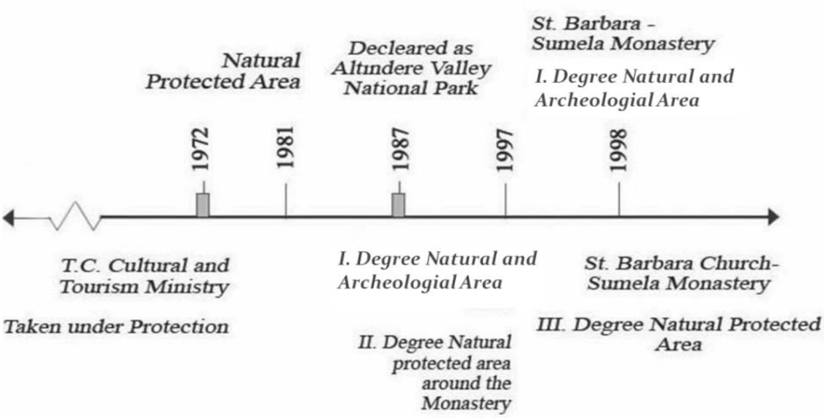

Figure 2: The changes of conservation status from 1972 to 1998 (Demir et al., 2015)

Due to its wide range natural and cultural resources, Mary Valley has gained national and international conservation values and tourism potential. Thus, in KAMAG (2011) and in DOKA (2012) projects and in many research (Demir et al., 2015; Pirselimoğlu & Demirel, 2015a; Pirselimoğlu & Demirel, 2015b) ecology-based tourism was proposed for this protected watershed area.

MATERIALS AND METHODS

The main analytical research process included data collection, image pre-processing, image classification and determining and comparison land use and land cover changes based on change detection and determining habitat function by using landscape structure metrics analysis.

Data Collection

The Landsat 5 TM images in 1987 (Sep, 08), 1998 (Sep, 22), 2009 (Sep, 04) and Landsat 8 OLI TIRS image in 2015 (Sep, 05) were used in the research (USGS download site (http://earthexplorer.usgs.gov/), which cloud cover of less 5%. The spatial resolution of all images was 30 m with the 7 bands for Landsat 5 TM and 11 bands for Landsat 8 OLI TIRS. In addition, one rectified 3m spatial resolution digital aerial photo dated at 2013 (August, 12) and the 30 m spatial resolution map in 2010

(Sep, 16) named "Globeland 30- N37" was utilized for the visual interpretation (GLC30, 2015) and accuracy assessment by using reference data derived these thematic information. Additionally, the land use and land cover data sources of Coordination of Information on the Environment (CORINE) and demographic structure (TURKSTAT, 2016) collected from intuitional environment were utilized for this study.

ERDAS 2014 program was used for all image pre-processing, classification and haze reduction. ENVI+IDL program was used for decreasing the black line gaps of the images based on Landsat gap fill process. ARCGIS 10.2 was used for geometric correction, conversion raster data to vector data and determining the LULC changes and FRAGSTAT 4.2 (McGarigal et al., 2012) was used to determine habitat function of land cover types by landscape structure metrics.

Image pre-processing

These steps were conducted to eliminate band combination based on stack layers, top of atmospheric radiances (TOA), atmospheric correction, haze reduction and the normalized difference vegetation index (NDVI) analysis. Firstly, the digital numbers (DN) layers were come together with stack layer modeler. Therefore, DN layers were readily available for the next step called top of atmospheric radiance and reflectance computation (TOA). For this step, the TOA modeler was created for each image to minimize atmospheric effects (Bozkaya et al., 2015; Tian et al., 2014). The next step, the radiative transfer model was used for the atmospheric correction of these satellite images by using the simulation of the satellite signal in the solar spectrum (5S) to compute the atmospheric effects attenuation of the solar radiation which reflected radiation or radiance from surface (Ozyavuz, Satir & Bilgili, 2011). Then all values were evaluated for the satellite images, separately. After this stage, the Landsat images were geometrically corrected and registered to the Universal Transfer Mercator (UTM) projection system (datum WGS 84, zone 37N) for geometric correction. The Landsat fill gap was used for eliminating and reducing the black line gap and haze effects in the visible bands of Landsat images (Yale, 2015) to enhance the accuracy of classification. In the last step, NDVI analysis provided to increase the green vegetation amounts (Esbah et al., 2010). Hence, it causes to recognize effectively the differences between vegetation and other land cover types by using the near infrared (NIR) and red bands (NIR-red/ NIR+red) for each image (Ozyavuz et al., 2011).

Image Classification

Classification process makes to group pixels which has similar spectral values (Kara et al., 2013; Bozkaya et al., 2015). To detect land use/cover types of this research was carried out using the maximum likelihood supervised classification algorithm. This classification is a statistical technique to select subjectively different training samples of the each type by users (Braimoh, 2006). In this process, 342, 329,303 and 323 training areas were selected dated at 1987, 1998, 2009 and 2015 respectively. After that, forest areas (broad leaf and needle forest), shrub, grassland, bareland (gravel and bare ground) and cropland were identified as land use/cover classes for the research. These classified data were compared with the GlobeLand 30- N27 classasified map and the digital aerial photo (2013) and ground control points by on-screen digitizing method to improve accuracy rates of each classification maps and solve the mixed pixel problem. For this stage, overall accuracy and kappa statistics were calculated by using 800 independent test samples based on error matrix. The statistical results were 94% (kappa: 0.92), 94%

(kappa: 0.92), 92% (kappa: 0.89) and 93% (kappa: 0.91), respectively for 1987, 1998, 2009 and 2015 classified images.

Change Detection

This process was used to compare two years by from-to analysis (Francisco & Hochschil, 2012; Tian et al. 2014). The transition matrix (cross- tabulation) is a most effective change detection technique to detect and monitor the changes the differences of two images and demonstrates the transformation of each LULC by post-classification comparison (Fichera et al., 2012; Kara et al., 2013; Kuter & Kuter, 2015). This tabulation indicates the rate of each class in the diagonal and off-diagonal rates (Tian et al., 2014; Rawat & Kumar, 2015). The changes of LULC were determined and described between 1987-2015.

Landscape Structure Analysis

Habitat function refers to the movement of energy, water, soil, wind, fauna and flora with the scope of landscape function in a landscape structure (Forman & Godron, 1986; Leitão et al., 2006). In this scope, the change of habitat function was analyzed in LULC types in the different time periods. Thus landscape structure metrics analysis was used to determine habitat function, and also determine habitat function changes in different time periods in this study. Landscape metrics analysis has been used to assess the landscape functions and landscape change for the quantification of landscape pattern to compute complexity of landscape structure (Esbah et al., 2010; Gökyer, 2013). These metrics describe the four aspects of the relationship among the landscape patterns: measure, number, size and shape (Seto & Fragkias, 2005; Gökyer, 2013). Landscape metrics helps to evaluate the physical landscape changes and the relationship between landscape structure and function (Leitão et al., 2006). In this research, after obtaining LULC maps for four classified map-years, 16 landscape metrics were applied in FRAGSTAT 4.2 environment at the class level, which calculates each patch type of LULC category (Table 1). The metrics were assessed under four group metrics category according to their characteristics (McGarigal et al., 2012). Finally, all landscape structure metrics were brought into the common scale range [0,1] by normalization of ratings to generalize and objectively detect the habitat function values for each LULC category (Table 2).

Table 1: Metric groups for determining habitat function

Groups	Metrics
Area/edge metrics	Percentage of Landscape-PLAND, Total Edge-TE, Edge Density-ED, Patch Number-PN, Patch Density-PD, Mean Patch Size-MPS, Area Weighted Patch Size-AWP
Shape metrics	Mean Size Index-MSI, Area Weighted Mean Size Index-AWMSI, Area Weighted Mean Perimeter-area Ratio-MPAR, Area Weighted Mean Fractal-FRAC_AM
Core metrics	Total Core Area-TCA , Mean Core Area Index-CAI_MN
Isolation/contiguity metrics	Mean Euclidean Nearest Neighbors Distance-ENN_MN, Mean Contagion-CONTIG_MN

Table 2: Landscape structure metrics used for the study area

Landscape Class Metrics	Symbol	Explanation
Percentage of Landscape	PLAND	It measures the percentage of the each land cover class according to all landscape cover classes.
Mean Patch Size Patch Number Patch Density	MPS (AREA_MN) PN PD	MPS measures the size of discrete patches summarized across all patches of a particular land cover class. If the patch size is bigger, it has more habitat function. If it is used by Patch Number (PN) and Patch Density (PD), it can serve as a fragmentation. MPS is interpreted better by PLAND, PN and PD.
Total Edge Edge Density	TE ED	Total Edge (TE) is the total edge numbers for each landscape class. Edge Density (ED) is the total length of per hectare for each landscape class area. More edges mean higher possibility of edge effects. Edge effects cause to alter vegetation structure and animation abundance.
Mean Size Index Area Weighted Mean size Index Area Weighted Mean Perimeter-area Ratio	MSI (SHAPE_MN) AWMSI (SHAPE_AM) MPAR (PARA_AM)	It measures the average of the mean patch shape for each land cover class. AWMSI and MSI are related to the geometric complexity shapes of a patch because geometric shapes styles affect the edge effects and cross boundary. Linear, corridors, lobed, complex and convoluted patches shapes have greater amounts of boundary than round, compact and simple patch shapes. The rounded, compact and simple patch shapes are higher habitat function than others because more boundaries mean higher possibility of edge effects. Most of shape metrics are have a relationship with perimeter-area metrics.
Area Weighted Mean Fractal	FRAC-AM	It measures the total edge length of patches of each land cover class. It displays the fragmentation of habitat.
Mean Contagion	CONTAG-MN	It measures the average possibility of neighbors of each land cover class patches.
Mean Euclidean Nearest Neighbors Distance	ENN_MN	It measures the average distance of the nearest neighbors (contiguity) of each land cover class patches.
Total Core Area Mean Core Area Index	TCA CAI_MN	It measures the total core area of each landscape classes.100 m is based for the core area.

RESULT AND DISCUSSION

LULC and LULC changes

The LULC types of study area consisted of forest, grassland, bare land, shrub and cropland (Figure 3). According to result of LULC distributions from 1987 to 2015, the dominant LULC types were forest and grassland. LULC types of research area changed with a gaining bare land at the cost of losing forest, grassland, shrub and cropland respectively. Forest decreased from 1987 49.87% to 43.93 % in 2015, while bare land increased significantly. By 2015, the forest was still dominant and cropland subdominant in the study area. The bare land area increased significantly in 2015 compared to previous years, while the forest showed a sharp decline in 2015 (Fig. 4).

Also, the results of LULC classification analyzed by accuracy assessment and change detection of LULC analyzed by error matrix have an acceptable consistency (up %80).

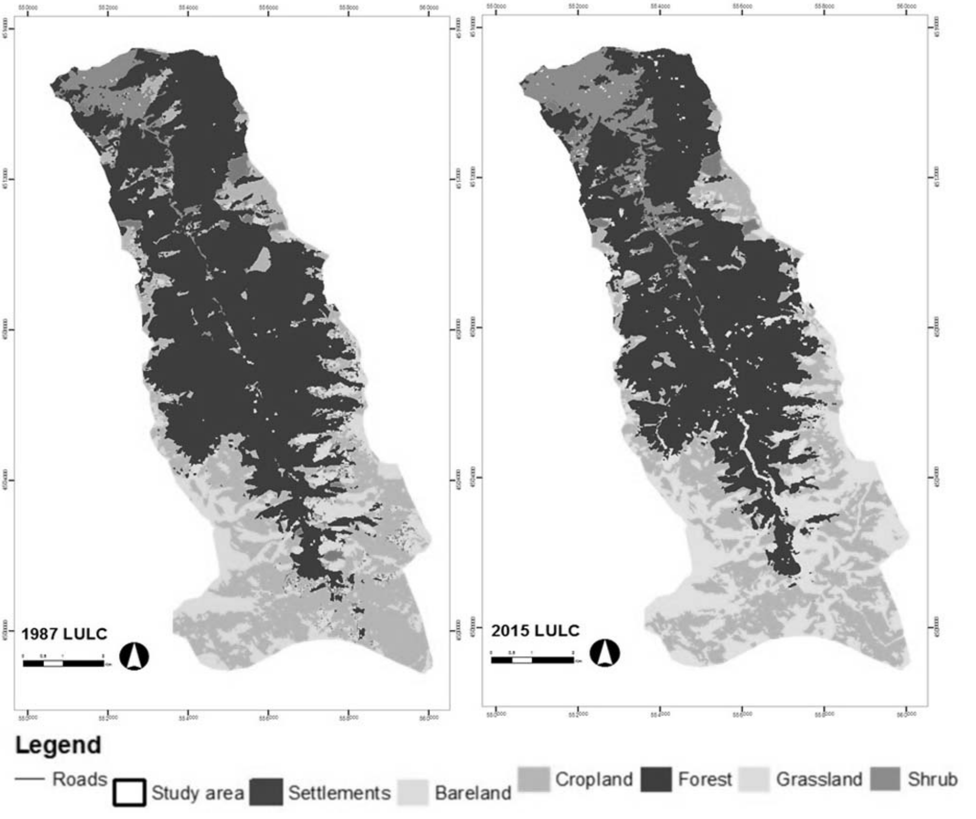

Figure 3: LULC between 1987 and 2015

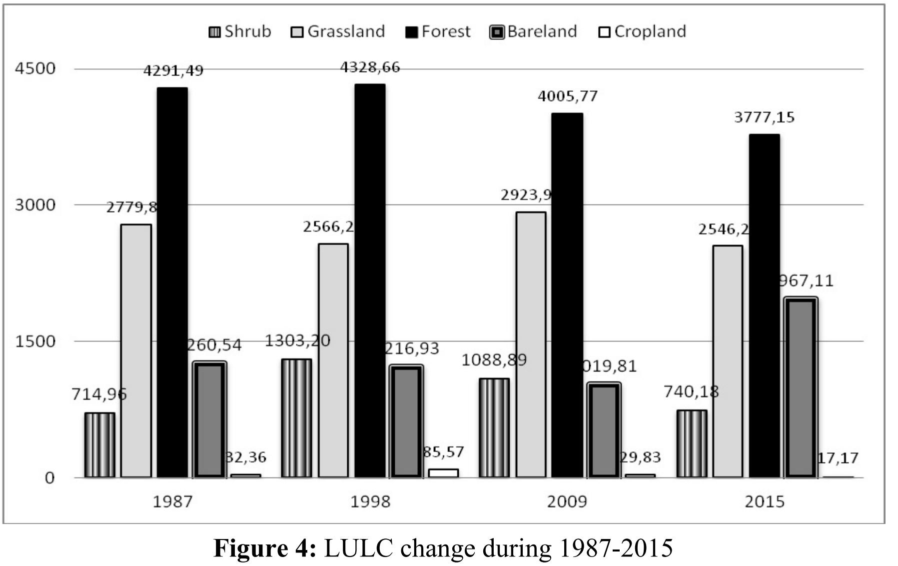

Figure 4: LULC change during 1987-2015

Forest experienced the highest loss with 580.23 ha, whereas bare land experienced the highest gain with 615 ha in the study area (Table 3). Loss in forest is most likely due to wood production and transformation to road networks for forest, villages, summer homes and ski center, whereas gain in bare land is due to transformation from grassland area. The results from 1987 to 2015 displayed constant decrease of cropland areas. The main reasons of this decline are the limitation agricultural and forestry activities in the national park and migration of local population to bigger cities for having better economic status. Although forestry activities were limited as well, the forestry area had similar decreasing trend due to hydroelectric power plants, road networks, deforestation and floods. In this case, forest was transformed to grassland, shrub and bare land within 28 years. It shows that besides anthropocentric activities lack of conservation and management strategies influenced negative impacts on LULC changes.

Table 3: LULC Change Matrix 1987-2015 (ha)

	2015 (ha)							
	Land Cover	**Forest**	**Grassland**	**Shrub**	**Bareland**	**Cropland**	**Total 1987**	**Loss**
1987 (ha)	**Forest**	**3310.56**	260.82	235.62	76.95	6.84	3890.79	580.23
	Grassland	73.35	**1682.28**	99.36	367.56	6.57	2229.12	546.84
	Shrub	36.63	131.49	**375.75**	159.39	3.24	706.50	330.75
	Bareland	1.80	63.18	3.51	**811.80**	0.63	880.92	69.12
	Cropland	4.41	16.47	6.12	11.16	**55.62**	93.78	38.16
	Total 2015	3426.75	2154.24	720.36	1426.86	72.90	**7801.11**	**1565.10**
	Gain	116.19	471.96	344.61	615.06	17.28	**1565.10**	**20.06 %**

Habitat function

The habitat function of the research area was evaluated by landscape structure metrics in term of LULC types between 1987 and 2015. From 1987 to 2015, the generally habitat function of forest, shrub, cropland, grassland and bare land were listed from highest to lowest (Figure 5). The habitat function of forest decreased sudden in 1998 compared to other periods. This loss of forest habitat converted into gain of shrub, cropland and bare land habitat function. Wood production and road networks represented a key factor of forest transformation. According to this result, the habitat functions of shrub was the highest (1.00) among the LULC types in 1998, and the habitat function of bare land was the low (0.220). In 2015, forest experienced the highest habitat in 1.00 due to uniform, compact and unfragmented patches, followed by grassland in 0.540 and bare land experienced the lowest in 0.00 due to fragmented and dispersed smaller patches in the south of research area (Table 4).

The studies of Esbah et al. (2010), Malaviya et al. (2010) and Fichera et al (2012) were explained that landscape structure metrics indicated direct or inverse impacts of habitat function. In this case, in this research, it was all metrics were evaluated separately which are directly or inversely related to habitat function. For having objective assessment, all metrics were defined from 0 to 1 by normalization statistic. It would be an effective and easy way to enhance our understanding and to measure the effects of metrics on habitat function. Further, the high number of metrics creates difficulties for evaluation of habitat function. Thus the selected 16 metrics were grouped under 4 categories according their characteristics but it will be useful to limit the number of them by grouped statistically method like factor or cluster analysis with experts participation (Mairota et al., 2013).

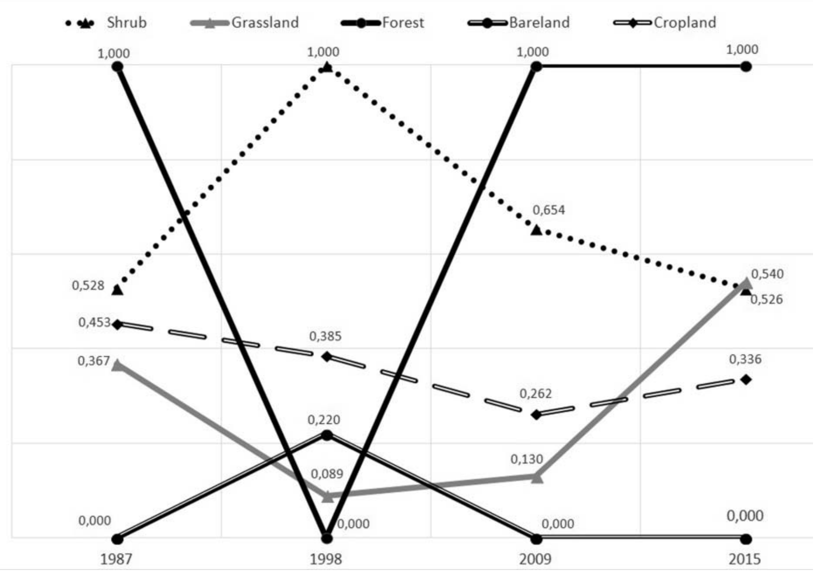

Figure 5: Habitat function in 1987-1998-2009-2015

Table 4: Habitat function changes between 1987 and 2015

LULC Type	Year	Area/edge metrics	Shape metrics	Core metrics	Isolation/contiguity metrics	Normalization
Shrub	1987	0,059	1,000	0,000	1,000	0,528
	2015	0,000	1,000	0,048	1,000	0,526
Grassland	1987	0,000	0,576	0,272	0,935	0,367
	2015	0,130	0,704	0,284	0,958	0,540
Forest	1987	1,000	0,000	1,000	0,864	1,000
	2015	1,000	0,177	1,000	0,874	1,000
Bareland	1987	0,201	0,039	0,053	0,863	0,000
	2015	0,089	0,000	0,000	0,844	0,000
Cropland	1987	0,854	0,279	0,797	0,000	0,453
	2015	0,239	0,608	0,798	0,000	0,336

CONCLUSION

The research of the Mary Valley, Trabzon aimed to monitor the changes of LULC and habitat function within 28 years by change detection and landscape structure analysis. This study integrated the RS and GIS to detect the changes of LULC and habitat function. The context of landscape changes, landscape structure metrics added a quantitative approach to assess the temporal changes of habitat function in each LULC type. According to results, this research can provide to create alternative future landscape planning based on tourism and conservation for the sustainable development and ecological integrity of this protected watershed area.

The LULC changes around the watershed displayed that the protection strategies taken by institutional environment were not sufficient to prevent the loss of resources. Besides, the conservation status changed several times. This is a significant issue and should be stable for protecting ecological and cultural resources. Therefore, according to these resources, the last comprehensive protection status should be determined and it should be covered all watershed area not just Altindere Valley National Park. In this context, the visitor and land resources management, and suitable ecotourism activities based on conservation plan are proposed as a future landscape planning strategies for this research. This plan will be significantly important for providing sustainability specific and characteristic landscape values in the watershed of Mary Valley and its protection area. In order to promote sustainable development of this area, conservation and tourism plan, visitor and land resources management should be generated for the future landscape planning strategies with monitoring criteria.

For this reason interdisciplinary scientific council supported by central and local institutional environment with participatory approach should carry out to introduce and defines legislation for all protection and managements steps.

The method and findings of this study, determining LULC changes and habitat function can be taken into consideration in order to keep sustainability of ecological and cultural resources for further similar studies of protected watershed area in Turkey and other countries in the world.

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Chapter 18

The Monumental Plane Trees of Bursa and Their Contribution to Cultural Landscape

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INTRODUCTION

Trees have been accepted as a cultic symbol from past to present, and they have played the role of intermediary like "arising" in the worlds of belief and thought of human being, nutrition, making contact with the God, reaching the heaven, healing, wish and so forth. Tree has been regarded as a divine existence in the human culture, and it has been thought as an "organism" that has the power of making it rain, making the weather become sunny, reproducing herds and cattle and making women give birth (Ergun, 2004).

The fact that the tree has been seen as beauty, courage, resistance and the basic power of life has been shared as a universal value. Various societies created magical totems from trees, and some trees with special quality were consecrated by the adjectives "sainthood" and "prophecy" (Dirik et.al. 2014).

There is the tree – which interconnects three worlds, which constitutes the assurance of the world order and of which each one has a separate meaning – in the center of the Turk's perception of the world. The tree symbols that organize cosmic order are the common symbols of all the world of Turks. The leading enshrined trees are beech tree, pine tree, cedar, juniper and plane tree. These are the trees that are the symbols of tree of life and heaven; they are called as the holly beech tree, Aal Luuk Mas, Aal Kuduk Mar, the supreme tree, the coarse tree, the head tree, the king tree, the cam tree, Cangız beech tree, the lonely tree, and they are regarded as heavenly trees (Ergun, 2004).

Ebu'l-Gazi Bahadır Khan wrote in his book *The Bloodline of Turks* as follows: "Keranca Hodja who was from the Kayı community had a poor son named Togurmış. One night Togurmış saw in his dream that three trees turned green, rose from his chest and branched out. In the morning he told Miran the Oracle his dream. Miran the Oracle said to Togurmış that that dream was good and told him not to tell anybody (Duman, 1999).

It is a known fact that a similar dream was seen by Osman I (the founder of Ottoman Empire – T.N.). Historical records reveal the following: "Osman saw in his dream that he was lying down next to the Sheikh. In the meantime the moon rose from

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Sheikh Edebali's (Osman's mentor – T.N.) chest and when it became full moon, it went down and entered his own chest. Then a tree grew, rose, and turned green and bloomed. It was covering the whole world with the shadow of its branches. He saw four ranges of mountain next to the tree which were Caucasus Mountains, Atlas Mountains, Taurus Mountains and the Balkans. The Tigris, Euphrates, Nile and Danube Rivers came out of the roots of the tree, and they had ships on them like seas. Fields were full of crops. The top parts of the mountains were covered with dense forests. Cities were located all over the valleys. Each of these cities had a crescent on their golden domes, muezzins were reciting the azan from innumerable minarets and these sounds were mixing with woodnotes. The leaves of the tree started to grow taller like swords. At that moment, the wind blew and turned the direction of the leaves to the city of Istanbul. The city was like a diamond that was placed between two seas, two lands and two pieces of turquoise and thus it was the precious stone of the ring which a large country that embraced the whole world constituted. Osman woke up while he was wearing the ring" (Duman, 1999).

After the collapse of the Seljuk Empire, the Western Turks experienced interregnum; they revitalized the Turkish world domination ideal by the foundation of the Ottoman Empire, and this revival was symbolized by a plane tree that embraced the world in the dream of Osman I (Ergun, 2004). Thus the state, which was seen as "a Beautiful Tree with Leaves Having a Strong Root, Trunk and Branches" in the Turkish history of thought, found its form in the plane tree in Anatolia. It is a known fact that especially in the first years of the sultanate, everywhere was furnished with plane and cypress trees, which were considered as the symbols of the power of the state and eternity, in the capital city of the empire Bursa. This point and other relevant points reveal the importance of trees clearly throughout history from socio-cultural and folkloric points of view in the scales of people and society, and these points also show that trees comprise an essential component of communal living (Dirik et.al, 2014).

In this regard, trees that have a special mystical and folkloric story in the culture and history of the region in which it is located and that witness certain events throughout history are accepted as monumental trees. Hence, Asan (1992) defined monumental trees as *"trees having dimensions – age, diameter and height – above the accustomed measures of their own kind, having a special position in the region's folklore, culture and history, and having natural lifetime that is long enough for them to be able to communicate between the past and the modern-day and the modern-day and the future are monumental trees"*.

Many monumental trees, especially plane, cypress and oak that disappeared or survived until modern-day in a lot of residential areas especially in the capital cities of the Ottoman Empire Bursa, Edirne and Istanbul serve as a bridge between the past and the future, play important roles in the conveying of the events they witnessed through the years to modern-day and contribute to cultural landscape.

The Features That Monumentalize Trees and the Functions of Monumental Trees

As is also understood from the above-mentioned "Monument Tree" definition, the features that monumentalize trees can be collected under two groups. These are given below (Şimşek et.al, 2014).

1-Physical Size and Visual Features

1.1. Monumental trees in terms of physical size

1.2. Monumental trees in terms of visual features
2-Social and Cultural Features
2.1. Monumental trees with their mystical aspect
2.2. Monumental trees with their historical aspect
2.3. Monumental trees with their place in mythology and epics.
2.4. Monumental trees with their folkloric aspect
2.5. Monumental trees with their contribution to art aspect
2.6. Monumental trees with their contribution to scientific researches aspect
2.7. Monumental trees with their ecotourism aspect

On the other hand, monumental trees have many functions in social life. These functions can be summarized as below (Sarıbaş, 2015).

The Functions of Monumental Trees as Cultural Heritage: Monumental Trees resemble historical and archeological remains but discriminately are living and unmovable cultural beings. They have a special position in the folklore, culture and history of the region in which they are located, and they have a natural lifetime that is long enough for them to be able to communicate between the past and the modern-day and the modern-day and the future. The factor that adds historical and folkloric features to trees in the historical process is their direct relationship with people and events.

The Functions of Monumental Trees in Scientific Terms: Because monumental trees are developed and shaped according to the climatic-edaphic-biotic conditions of the environment they grow, they have the characteristics of dendroclimatological, dendroecological and at the same time dendrochronological material. At the same time, these trees are qualified as biogenetic reserve as they can also represent the habitats in which the above-mentioned species rarely exist or rare genotypes.

The Functions of Monumental Trees in Esthetic and Touristic Terms: Monumental trees are among important visual elements in urban and rural landscape because of their greatness and habitus. At the same time they draw interest aesthetically with the plastic values they exhibit in the environment they grow. The fact that monumental trees draw very much interest has an effect of increasing their touristic value.

The Existence of Monumental Plane Trees in Bursa and Their Distribution by Counties

According to the records of the Ministry of Environment and Urbanization, the Governorship of Bursa, the Provincial Directorate of Environment and Urbanization and the Natural Heritage Branch Office for the year 2015, there are 1001 monumental trees in the province of Bursa and its counties belonging to various species which were officially registered or of which registry process is in progress and which are being recorded, and 71.83% of the monumental trees that were recorded belong to the *Platanus* (plane trees) species (Zencirkıran et.al, 2016). The total number of monumental plane trees that were registered or that are at the registry stage in the province of Bursa and its counties is 719, and their distribution by counties is shown in Figure 1.

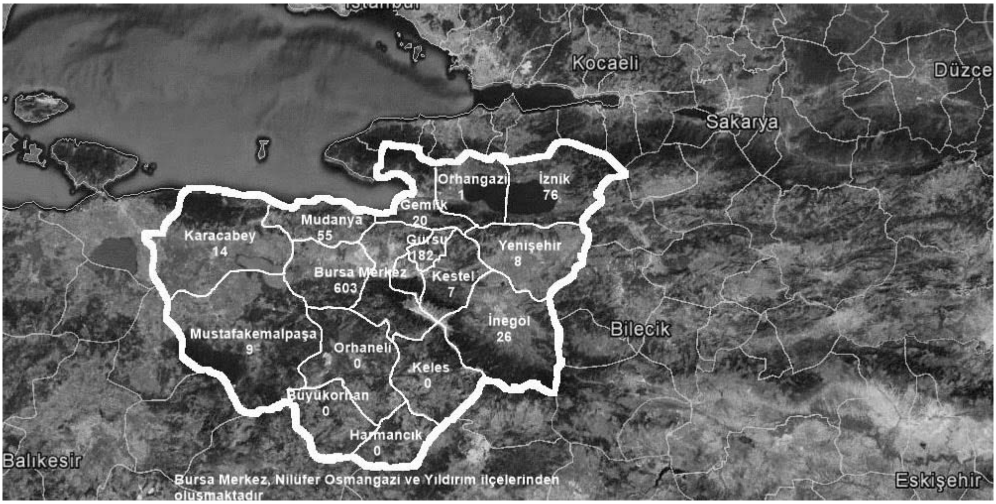

Figure 1. The Distribution of Monumental Trees in Bursa and Its Counties (Registered or Registry in Progress)

The Social and Cultural Features of Some Monumental Plane Trees of Bursa and their Contribution to Cultural Landscape

The Crying Plane Tree

According to the legend, once upon a time the Odryes Creek south of the Marmara Sea used to flow into the sea in the town of Bandırma. The Apollonia Kingdom used to be located near Ulubat Lake, and the Melde Kingdom used to be located near the Odryes Creek. The king of Melde asked for the daughter of the king of Apollonia in marriage with his son. However the girl did not marry the prince as she did not want that marriage. In order to protect his daughter, the king of Apollonia ordered a palace to be built on a hill and hid his daughter there. With that, the king of Melde lost his temper and chose to revenge in order to defend his honor which had been stained because of not being able to get the girl he wanted for his son. Therefore he changed the path of the Odryes Creek and ensured the water flow into the land where the city of Apollonia was located. Thus all the land of Apollonia submerged and the palace hiding the princess remained as an island surrounded by water, and Apollonia came into being that way. In Anatolia, 9 cities are known to be named Apollonia. However as Gölyazı was established near Ryndakos Creek (Orhaneli Creek), it is known in history as "Apollonia ad Ryndacum". In the Ottoman era, the name of Apollonia ad Ryndacum changed into Apolyont as the people called it, and Christians were in majority in the city but Christian and Muslim Ottoman citizens lived together. Today the city is called "Gölyazı".

Biologist Mehmet Okatan gave the name the Crying Plane Tree. The tree is in Gölyazı and its epitaph reveals that the tree is 750 years old (Figure 2). The story of the Crying Plane Tree goes back to the years when Turks and Greeks lived in the island together centuries ago. The lovers whom the plane tree cried for were the handsome Turkish young man Mehmet and beautiful Greek girl Eleni. They grew up together since their childhood in a peaceful environment without ever being separated from each other. But the hostility that started between these two nations affected them negatively.

Greek towns were emptied and the Greeks living there were decided to be exchanged with the Turkish population living in Thessalonica. When Mehmet learned that his lover Eleni were among the departed Greeks for migration, he also took to the roads and started searching for her. Eleni's elder brother Yorgi crossed Mehmet's path and said that the brotherhood was over, hostility started that would last forever, and he wanted to prevent Mehmet from reaching Eleni. Mehmet refused to break his promise and to give up his love.

Figure 2. The Ağlayan (Crying) Plane Tree (Original-2016)

Yorgi could not control his anger, killed Mehmet and left him there in a pool of blood. Mehmet used his last power to get to the plane tree where he had been secretly meeting Eleni and wrote a note on the bark of the tree with his blood. The note read *"my dear love; I will wait for you here forever"*. Unaware of what had happened, Eleni was travelling in the convoy with her family and learned the incidents from her confidante Penelopi. She left the convoy and went to the plane tree which was the first place came to her mind to find Mehmet. She hugged Mehmet's dead body for the last time, read his note and killed herself under this plane tree which was their secret meeting place and the witness of their love. Çınar on the other hand have conveyed their story to the future, and have been shedding and will always shed bloody tears forever.

Dua (The Prayer) Plane Tree

Today, the "Dua Çınarı" is the name of a neighborhood and a subway station. It used to be a plane tree that was on the Bursa-Ankara highway but could not reach the present day. It was demolished in 1991. Today, nothing is left from that tree except two pieces that were cut from the trunk of the tree, a few pictures and stories told (Figure 3). These pieces are exhibited at the Uludağ University Art Gallery. The story of the Prayer Plane Tree is given below.

Sultan Yıldırım Beyazıt was getting the Grand Mosque of Bursa built after the Niğbolu victory. During the construction of the mosque, Sheikh Hamid-i Veli, who was known as the Father of Loaves, supplied the breads of the workers. After the mosque was completed, the opening ceremony was announced to be held on a Friday. That day, all the people from Bursa, especially the Sultan Yıldırım Beyazıt, his son-in-law a great intellectual and Saint Seyyid Emir Sultan, venerable Molla Fenari and many high-level men of God filled the Grand Mosque. The Sultan Yıldırım Beyazıt assigned the task of reading the opening sermon to Emir Sultan. Emir Sultan said "your majesty; it is not appropriate for me to read the sermon as the great intellectual of our time is here. The person who deserves to read the opening sermon of this mosque is that person" and showed the Father of Loaves. The Father of Loaves knew these words of the Prophet Mohammad: "fame is disaster". Therefore he abstained from fulfilling that duty. But when the Sultan ordered him to do it, he walked towards the pulpit. When he came next to Emir Sultan, he said "dear Emir, why did you act that way and told on me?" Emir gave the answer "I did so because I could not see a person ahead of you". The Father of Loaves climbed the pulpit and told such a sermon that the people of Bursa had never heard any sermon like that. The people of Bursa understood the greatness of the Father of Loaves only after that speech. As a part of the sermon, the Father of Loaves said "some intellectuals of our religion have difficulties in commenting the surah al-fatihah (a section of the Holy Koran – T.N) and there are parts that they do not understand. That is why let us comment this surah". Then he made seven types of comments based on twenty basic sciences. Molla Fenari said that the first comment was understood by the whole community, the second one was understood by part of the community, the third one was understood by very few of the community and the fourth and subsequent ones were not understood by anybody. After the Friday prayer, all the community wanted to kiss the Father's hand with respect and receive his blessing. The venerable Hamid-i Veli did not want to refuse them and waited in the doorway. All the people who came out of the Grand Mosque's three gates said "I have been honored by kissing the hand of the Father of Loaves with respect."

After his true position was understood by everybody, the Father of Loaves said "our secret has become known; everybody understood it" and wanted to leave Bursa. Early in a morning, he departed from Gavas Pasha Muslim Theological School with a few of his students. After hearing that the Father of Loaves was leaving Bursa, Molla Fenari ran and reached him next to a plane tree. He asked him and even begged him very much not to leave but he could not procure acceptance. In the end, he asked the Father of Loaves to pray for the people of Bursa. The Father of Loaves turned to Bursa direction next to this plane tree, and he prayed for the city to be a prosperous, fertile city and remain green. Then the Father of Loaves said goodbye and left. In Bursa, this plane tree has been known as "the Prayer Plane Tree". For many years, groups of soldiers and pilgrimage groups were sent off from that point and welcomes took place at that point.

Another version of the story indicates that the Father of Loaves was a holy person who was a baker and made the breads of the workers working on the construction of the Grand Mosque. Because he was afraid that he would be worshipped if it was known that he was a holy person, he did not want the place of his grave to be known after his death. That is why he left the bakery and went to the area around the Prayer Plane Tree when the construction ended. That area was deserted at that time. He planted the dry stick on the ground that he had been using for baking breads and he wanted God to take his life. The dry stick became a green tree after a short while. The people looked for the Father of Loaves and saw him miraculously flying away from the green plane tree (Şimşek et.al., 2014).

Figure 3. The Prayer Plane Tree and the Remaining Pieces

The Dudakla Plane Tree

It is located in the Dudaklı neighborhood in the county of Kestel in the city of Bursa (Figure 4). It is known in the records of 1400s – at the time of the Ottoman Empire – that in this town there were foundations of Emir Sultan, Murad II and Gulruh Sultan. Early on, sweet mulberry were grown in the town, and the name of the town "Dudaklı" comes from mulberry (in Turkish the words are similar – T.N.). The "Dudaklı Plane Tree" is approximately 1 km away from the town, the circumference of its trunk is 17 meters and its internal clearance is 5 meters. According to the stories of the time, Gulruh Sultan – the mother-in-law of Sultan Bayezid II, and the mother of Alem Şah (the sultan's wife) – came to the place from time to time and sat under the shadow of the tree. Various sources and the people of the town indicate that the plane tree is about 1200 years old. Considering that this calculation is right, this tree existed in the region 129 years before Turks came to Anatolia (1071). In Bursa, it is the oldest plane tree and the plane tree with the thickest trunk (the circumference of the most known plane tree Inkaya is approximately 10 meters).

Figure 4. The Plane Tree of Dudaklı Town (Original-2016)

Eskici Baba Plane Tree

This plane tree was a source of inspiration for Ahmet Hamdi Tanpınar (a Turkish poet – T.N.). In his poem named "Time in Bursa" he described this grand plane tree:

"The courtyard of an old mosque in Bursa,
The splashing water in the little fountain,
A wall from the time of Orhan,
An old plane tree at the same age…"

Figure 5. The Eskici Baba Plane Tree (Original-2016)

It is the oldest plane tree that is located in the northeastern corner of Orhan Mosque (Orhan is the second sultan of the Ottoman Empire – T.N.). The circumference of its trunk is about 10 meters. According to the rumors about the past, the tree used to have 7 main branches but it was damaged due to strong southwester and some of its branches were broken. It was recently cured and currently has 2 main branches on the main trunk. The tree was registered with 31-3 inventory number, and it is 437 years old as of the year 2016 (Figure 5).

According to rumors, an old man used to collect waste under this plane tree and everybody liked him. One day he got lost in the tree. According to another belief, an old man named Mustafa used to be the muezzin of the Mosque of Orhan and at the same time he was shoemaking the cavity of this plane tree which is in the mosque's garden. One day this old man went into the cavity of this plane tree and did not get out again. People believed that the old man rose to the sky from the plane tree which has an open top like a chimney and this plane tree is called The Plane Tree of the Waste Collector Old Man (Yörüklü, 1997; Özer, 2010; Yalman, 2011).

Geyikli Baba (The Father of Geyikli (The Father Sultan) Plane Tree

It is a plane tree which is located in the garden of the Grand Mosque and Mausoleum of Geyikli in the neighborhood of Babasultan which is in the County of Kestel. According to rumors, the father of Geyikli settled in the town of Babasultan in 1318 and this plane tree was planted in the same year. The plane tree is 698 years old, its circumference is 12 meters and its internal clearance is 4.80 meters (Anonymous, 2012) (Fig. 6). Every year, commemorative ceremony is organized for the Father Sultan (The Father of Geyikli) and rice is served. The 638th ceremony was organized in 2015. The following stories are told about the plane tree.

Figure 6. Geyikli Baba (The Father of Geyikli (The Father Sultan) Plane Tree (Original-2016)

In the years when the Ottoman Empire was founded, the second sultan of the empire Orhan sent a message to a dervish who was wandering around with deer and was known in the region as The Father of Geyikli to come and visit him in his palace. The dervish neither accepted the invitation nor wanted Sultan Orhan to visit him. He said *"the dervishes are observers; they observe the prayer time. I hope I will go to the* *palace of Sultan Orhan and pray in due time."* After some time, the dervish went to the palace of Sultan Orhan and planted a sapling. Sultan Orhan came to the dervish when the planting was over. Without giving any chance to Sultan Orhan to talk, the dervish said *"this is our celebration. The prayer of dervishes is good for you and your generation"* and moved away.

After some time, Sultan Orhan went to the place of the dervish and said to him *"grandfather, I want the Inegöl region to be yours."* The dervish refused the offer by saying *"Your majesty! God gives the state to sultans like you and the property to the masters of it. We are not masters of it."* Then Sultan Orhan insisted by saying *"dervish, obey my order"*. At that point the dervish could not refuse the sultan anymore and said *"you are the sultan; let me act on your advice"*. Then he pointed the hill and said *"please give the area from that hill until here to dervishes"*. After some time, the dervish died and Sultan Orhan had a mausoleum on his grave and a mosque next to it. On the other hand, another story about the tree is as follows: The Father of Geyikli was a warrior of Sultan Orhan in the years when the Ottoman Empire was founded. He was a combatant fighting on a deer rather than a horse. He was fighting with a sword that weighed 75 kilograms, and at the time of sunset he went into the cavity of a chestnut and disappeared. After this saint fought until sunset, he went to the tree; the tree cracked, took the Father of Geyikli in and closed. As the tree looked normal, the opposing forces following the dervish could not find him. Yunt (1940) indicated that during the conquest of Inegöl and the area around it, the Father of Geyikli conquered the Redchurch with 360 gates (Şimşek et al., 2014).

The Inkaya Plane Tree

This plane tree is located in the Inkaya neighborhood (town) on the way to Uludağ Mountain. The estimated age of the tree is 610 years, its trunk circumference is 9.50 meters and its height is about 45 meters. This plane tree has 13 main branches (Fig. 7).
The known stories of this plane tree are about our recent history. According to Dara (2011), these stories can be summarized as follows: 1.

Figure 7. The Inkaya Plane Tree (Original-2016)

During the Turkish independence war, all the Greeks died who cut a main branch of the tree despite the insistence to them not to do so. 2. Substantial amount of water flew from the cut branch for many years, 3. In 1921, the plane tree became the target of the bullets of Greek soldiers, shed water from its wounds like tears and buried the bullets in its structure.

The Kavaklı (Kavaklı Mosque) Plane Tree

The rumors reveal that this plane tree, which is located in the garden of the Kavaklı Mosque, was planted by the Father of Geyikli (the Father Sultan) in order to wish the persistence of the Ottoman Empire (Figure 8). The legend that has been told for the tree is as follows: the Father of Geyikli joined the conquest of Bursa on the back

Figure 8. The Kavaklı (Kavaklı Mosque) Plane Tree (Original-2016)

of a deer. Early in a morning, he got up from the point he had laid his fur and went to Bursa. He came to the garden gate of Bey Palace, and tried to plant the poplar tree sapling (in the past, Turks used to call plane tree poplar tree) with cool manners. Soon, people realized that this person was the Father of Geyikli and Sultan Orhan was immediately informed. As soon as Sultan Orhan heard this, he come to the Father of Geyikli, kissed his hand respectfully and tried to convince the Father of Geyikli to stay there. The Sultan offered him estates that he did not want but could not achieve any results.

The Father of Geyikli wanted only the area that he stopped over (The Father Sultan today) and that is on the mountain foot of Uludağ to be assigned to him. He prayed saying "this plane tree is good luck. As long as it stands, the prayers of dervishes are good for you and your generation" and went back to his town.

The circumference of the plane tree is approximately 11 meters, and in the past, vegetable sellers and a shoe repairer worked in the cavity of the tree. Today, the place where the tree is located is named Kavaklı Neighborhood, and nowadays the tree struggles for its life with a few branches in the garden of the Kavaklı Mosque.

Kovukçınar-Ulufeli Plane Tree-Alufeli Plane Tree

The stories about this plane tree reveal that the tree was planted at the era of Sultan Yıldırım Beyazıt. The tree gave its name to a neighborhood of Bursa (Kovukçınar) and the street where it is located. This plane tree is one of the oldest plane trees of Bursa and inside the tree is a hollow like a cave. Its circumference is more than 18 meters. Some books indicate that automobiles used to go into the plane tree (Fig. 9), snake dances were organized in the tree until forty years ago and a small coffee shop was run in it. Various sources also indicate that another plane tree was planted inside the tree in 1972 (Yörüklü 1997, Kaplanoğlu 2003, Özer 2010). Because the plane tree is located in the middle of a green field, it was visited as a recreation area for many years. In 1988 it was destroyed, and today we have a small trunk in a large neighborhood and a few branches that came out of this trunk (Fig.10). The plane tree is said to be planted in the XIV. Century. The story below has been told for generations regarding the fact that the tree is called "Ulufeli Çınar" (in Turkish it means 'the plane tree with service pay in the Ottoman Empire').

The Sultan of the time, who is said to be Yıldırım Beyazıt, had a son. In the same day, he announced that all the mothers who gave birth to sons would deserve service pay and they had to apply to the palace. Among the mothers who applied to the palace, there was a 70-80 year-old woman. The men of the Sultan said to the woman that she could not have a child at that age, and she could be punished because she lied. On the other hand, the woman insisted that she had a child. Then the Sultan was informed about the issue and he ordered his men to go and check the woman's house. The men went to the woman's house wanted her to show the child. The old woman showed the plane tree sapling that she had recently planted and said “here is my son”. When the case was said to the Sultan, he ordered “a plane tree is as valuable as a boy; give the woman service pay”. She was given service pay and the plane tree was named “Ulufeli Çınar”. In the book called *Bursa with Its Natural and Monumental Works*, this event is stated to happen after the Niğbolu Campaign of the empire (Kaplanoğlu, 2003). As the Niğbolu Campaign was in 1396, the aforesaid plane tree must be around the age of 610-620. According to another story, the service payments of the Ottoman soldiers were distributed under this plane tree therefore the tree was given this name.

Figure 9. Kovukçınar-Ulufeli Çınar (Mesut Özkeser, 1946). (This picture was taken from the Bursa Research of Cultural Sources Library)

Figure 10. Kovukçınar-Ulufeli Çınar (Original-2016)

Figure 11. Yağcılar or Yaycılar Plane Tree (Original-2016)

Yağcılar or Yaycılar Plane Tree

It is a 400 year-old very healthy monumental plane tree that is on Çekirge Street, in Kültürpark (Figure 11). The rumors reveal that there was spring water named Yağcılar Springs in the past in the area where the tree is located, and this area was used as a recreation area by the people of Bursa. Some books indicate that in the years after 1960, the well was excavated again with the order of the mayor of the time, and the water was used in the watering work of Kültürpark.

The Zincirli (Chained) Plane Tree

It is a monumental tree that is around 260 years old and is located in the County of Osmangazi near central Bursa, in the southeast of Kültürpark and on a street. In the past, the animals sacrificed for God in the prayer room was hung on the tree with chains, and they were skinned out there. The chains are now fused in the tree (Figure 12). Because this chain dangles from the tree, it is known as the *“Chained Plane Tree”*.


Figure 12. The Chained Plane Tree (Original-2016)

CONCLUSION

One of the capital cities of the Ottoman Empire, Bursa is the fourth biggest city of modern-day Turkey, and it is one of the most developed cities of Turkey. The fact that Bursa has modern tools of development and also cultural and natural heritage makes Bursa a leading city. As a result, cultural tourism and ecotourism activities have gradually become prevalent. In this regard, monumental trees have become more important due to the facts that they are among Turkey's important cultural properties and are bridges between the past and the present because of their contribution to cultural landscape. It is surely beyond doubt that protecting the cultural heritage of our monumental trees and passing this heritage to our next generations are among our important duties, and this study tries to contribute to fulfilling these duties.

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Chapter 19

Evaluation of Visual Effects of Roadways in Urban Areas: The Case Study of TAG Highway

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INTRODUCTION

Negative visual effect which is called visual pollution is generally defined as all views existing on natural and cultural environment which discomfort people. (Kumbaracıbaşı, 1991) defined visual pollution as "all untidy formatting exist on natural and artificial environment which mostly displayed indirectly and remain negative graphical symbols in memory".

Levels which air, water, soil and noise effected living life could be measured in quantitative and it could be prevented by legal regulations using limit values. Evaluation of pollution on view differs due to lack of quantitative data and not determining other pollutions as it is understood from the definition. Main reason of that is subjective effect of view in another saying it could be evaluated different according to the perspective.

However existence of visual pollution in a field is evaluated subjective, effects in case of existence could be observed clearly. As expressed by (Özbilen, 1997) visual pollution effects physical structure of environment and prevent fulfilling some functions also cause indirect effects on individuals. Visual pollution which has been an important problem especially due to fast and unplanned urbanization process effects psychological and physical health negatively so cause many problems which effects life comfort.

The effects of visual pollution are increasing tremendously from day to day. Many of the studies attempted to determine what caused to visual pollution. Visual pollution can be caused by large number factors including billboards, street signs, telephone and utility poles, advertisements, buildings (e.g. Najd et al., 2015; Samavatekbatan et al., 2016), wind turbines (e.g. Maehr et al., 2015; Manchado, Jauregui & Otero, 2015; Wrozynski et al., 2016) and highways (Hamersma et al., 2014; Jiang et al., 2015). The increase in high-rise buildings, street signs, telephone and utility poles, advertisements etc. brings negative change to the visual and physical characteristics of a city, which reduces the readability of the city and destroys natural environments.

A considerable amount of methodical researches have been done to develop methods for visual pollution in developed countries. Many of the studies attempted to quantify visual impact by developing objective indices (e.g. Rodrigues et al., 2010), while some others investigate human response to the visual effect of developments (e.g. Malkoç &Küçükerbaş, 2004; Özeren et al., 2011).

Transportation networks is the prior substructure projects which cause visual

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pollution in urban area. Akbar et al., (2003) present the results of a questionnaire survey of the views of the road users about the scenic beauty of current roadside vegetation and their perceptions of roadside vegetation with improved scenic value. The roadside vegetation was described by a majority of the respondents as unpleasant and drab. The respondents showed a positive attitude towards establishing a variety of vegetation types instead of a uniform seed mixture.

Clay & Smidt (2004) evaluate descriptor variables used by agencies to assess scenic quality along roads in their jurisdiction. Hamersma et al., (2014) discusses residential satisfaction of households near highways, based on survey data collected among 1 225 respondents in the Netherlands living within 1 000 m from a highway. Ordinal regression was used to study the impact of highway externalities on residential satisfaction. Jiang, Kang & Schroth (2015) studies the effects of the characteristics of the road project and the character of the existing landscape on the perceived visual impact of motorways, and developed a GIS-based prediction model based on the findings.

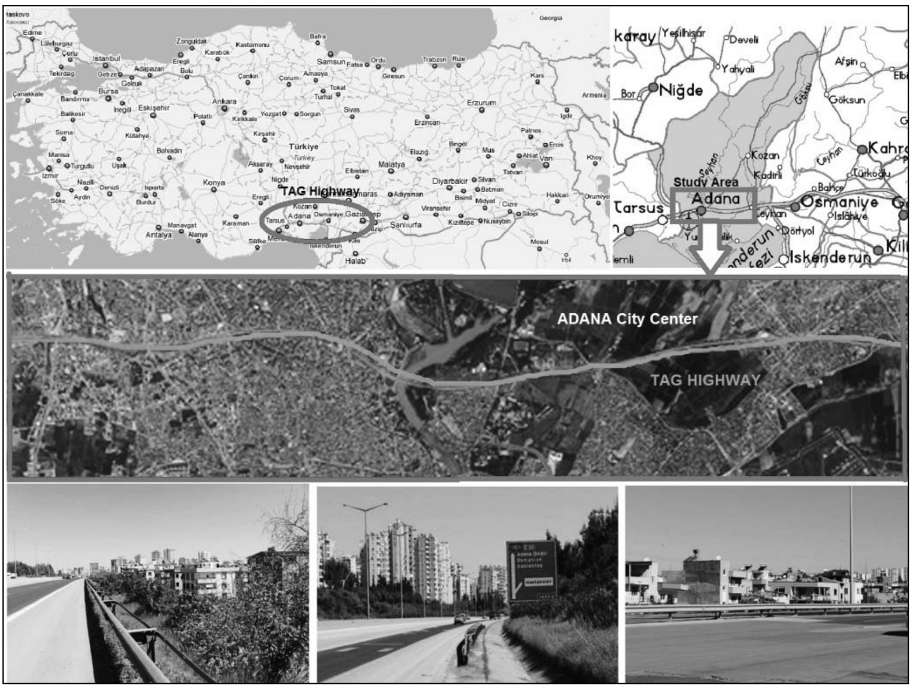


Figure 1: The location of the research area

As mentioned above transportation networks can cause negative effects on urban silhouette due to either dividing cities or including uncared views and materials. One of the transportation networks where mentioned effects are significantly realized is Tarsus – Adana- Gaziantep (TAG) highway. TAG highway which constitutes the main transportation corridors between Europe and Asia rides Adana city borders and divides city into two pieces. Section where TAG highway rides in Adana city center is surrounded with buildings. TAG highway where opened for transportation in the first years was not integrated with urban fabric as today. TAG highway which was tangent to city in some points included inside the city by the time due to the city enlarged toward the highway. Close of buildings to highway cause air, noise and soil pollution especially visual pollution due to TAG highway. In this study TAG highway which rides inside the city center of Adana was planned to research and it is planned to be a model research to prevent visual pollution.

MATERIALS AND METHODS

Research was materialized within Adana City center borders between “Adana (North) Airport junction” and “Adana East Kozan junction” 17 km route (Figure 1). 500 meters area in north and south side where the most effects of TAG highway is felt was included into research and realized in 1 900,62 ha area at four main phases.

On the first level of research, photos were taken from bridges, retaining walls, planting works in highway and environment. Than scales which are effective on visual effect within the scope of taken photographs. Survey form which was prepared within the scope of determined criterion, applied to the city residents who live on research area and their opinions were obtained about visual pollution arising from highway. Process about preparing the surveys and application of surveys has been given below with sub-titles below.

Determination of sample size: 451 384 individuals reside on research area. 1 045 individuals were surveyed according to size of sample, (Yamane, 2001) “model structure for determined susceptibilities” scale on 95 % confidence interval and 3 % acceptable error margin.

Selection of investigation method: survey was applied with standard forms with in situ survey method. Due to negotiation method is more confidential and faster it has been approved to use this survey method.

Preparation of survey: Survey was generated by two sections. At first section, socio economic conditions of participants were determined, on the second section 6 photos were showed to participants and they were asked to score these areas with two scales which were used by (Çakçı, 2007) utilizing from (Berlyne, 1960) and (Wohwill, 1983) visual perception researches. First of these scale is related how they liked these photos. Another scale evaluation was about how they founded areas interesting on the photos. Evaluation which participants were asked according to scales was realized in 5 points scale.

Pretest of survey and correcting errors: prepared survey forms were tested with two-stages. First phase appropriateness of questions according to statistical analysis methods were evaluated by experts on content, shape, meaning and evaluation titles. Finally comprehensibleness of survey was tested by persons who will apply surveys. Survey form which was prepared in the direction of opinions obtained from those individuals transformed into application level.

Application of surveys: due to it was aimed to represent survey work to whole research area it was applied in all neighborhoods of research area. Survey implemented individual was firstly informed by pollster about the content and purpose of survey. It was explained how to score photos on the survey and how to apply survey by shortly and plain.

Evaluation of surveys: SPSS 22.0 software was used for surveys’ evaluation.

On the second phase of research, opinions and recommendations which were obtained in consequence of survey work were evaluated. This method which was developed by (Çakçı, 2007) utilizing from (Nasar, 1992) gathers liking of user groups and expert evaluations was used by adopting purposed of research.

Spatial analysis of photos which were shown to user groups was realized by survey work prepared by expert group. Expert group was determined from 7 individual group consisted of Çukurova University Landscape Architecture Department lecturers and researchers and postgraduate students. (Küçükerbaş et al., 1999), (Kaplan et al., 2000), (Malkoç & Küçükerbaş, 2004) and (Özeren et al., 2011) were utilized and adopted to this research on formation of spatial characteristics. Expert group was asked to score mentioned photos within 5 points scale interval. Each spatial characteristic which was scored by expert group was expressed again with weighted average point which was specified on Table 1 for each photo.

Table1: Scoring scale of spatial characteristics on expert survey evaluation

Point	5	4	3	2	1
Well caring	Very well cared	well cared	moderate well cared	uncared	very uncared
Attractiveness	very attractive	attractive	moderate attractive	repellent	very repellent
Clearness	very clear	clear	moderate clear	complicated	very complicated
Originality	very original	original	moderate original	ordinary	very ordinary
Green density	green texture too dominant	dominant green texture	moderate dominant green texture	deprived of green	very deprived of green
Natural appearance	natural members too dominant	dominant natural members	moderate dominant natural members	artificial members are dominant	very dominant artificial members

In consequence of expert group evaluations within the scope of specifications given on the table, it was determined that which places are liked by participants and which characteristic places are considered as visually polluted. So findings obtained from the study removed from the specific area of TAG highway and determination of visual effects of roadways was provided generally.

The most effective tool where visual pollution was determined and necessary preventions were taken and works put into practice are legal regulations. Accordingly in the third phase of study, legal regulations which were prepared for prevention and/or decreasing of visual pollution were examined.

On the last phase of study, structural and plant accoutrement which caused visual pollution arising from highway were evaluated in field of their existing area, with the demands and remarks of city resident living on research area new plans and design recommendations which could prevent and /or decrease visual pollution were developed.

RESULTS

Findings of research constitutes 3 phases as determining of remarks and perceptions about visual pollution of individuals reside in effect borders of TAG highway, evaluation of expert group mentioned perceptions and remarks and finally scrutinizing legal regulations about the subject.

Determination of perception and remarks of visual effects of TAG highway

Gender, age, educational background, occupation and monthly earning of survey participators were given on Table 2.

Table 2: Socio-economic situation of survey participators

Socio economic situation		pcs	(%)	Socio economic situation		pcs	(%)
Gender	male	445	42,6	Occupation	workman	107	10,2
	female	600	57,4		farmer	6	0,6
	Total	1 045	100		retired	86	8,2
Age	18-24	220	21,1		officer	96	9,2
	25-34	249	23,8		independent business	57	5,5
	35-44	268	25,6		student	164	15,7
	45-54	188	18,0		private sector	69	6,6
	55-	120	11,5		unemployed	8	0,8
	Total	1 045	100,0		house wife	442	42,3
Educational background	illiterate	19	1,8		other	10	1,0
	primary	318	30,4		Total	1 045	100,0
	secondary	128	12,2	Monthly earning (TRY)	less than 1 000	266	25,5
	high school	321	30,7		1 000- 1 999	451	43,2
	college	31	3,0		2 000- 2 999	189	18,1
	university	215	20,6		3 000- 3 999	95	9,1
	post graduate	13	1,3		4 000 and over	44	4,2
	Total	1 045	100,0		Total	1 045	100,0

As seen on the table when the survey participators are evaluated with regards to age group, it was understood most of them were adult, employee group which are between 35-44 ages by 25,6%

Most of the participants are high school graduated by 30,7 %. Primary school graduated persons came after this rate by 30,4 %. While 20,6 % of participators were university graduated but only 1,3 % of them were received post graduate education.

Mostly housewife who stays in the house more effected from the highway effects. That is why a significance important part of surveys as 42,3 % were realized by housewife who stay at home in day time.

Firstly general visual effects of highway over city silhouette were evaluated in the study. Evaluated was realized with 5 points scale level determination question according to likings highway view and finding interesting. Relation between liking and finding interesting situations of participators and education background of participators was given on Table 3 and Table 4 respectively.

Majority of participators by 33,9 % mentioned that they liked too much highway view. Besides 24 % of them said they never liked highway view. By the way 43,7 % of participators mentioned that they never find interesting highway view and 17 % of them mentioned they found interesting.

In consequence of evaluation it was determined there is a significant relation between liking and finding interesting of highway views and educational background of participators. As seen on the table, except college graduates there has been a decreasing on finding and liking highway view as long as the education level increases.

Table 3: Liking situations of participator individuals according to their educational background

Educational background		Liking level					total
		I never liked	I did not liked	I like moderately	I like	I like much	
illiterate	Pcs.	4	2	1	5	7	19
	(%)	21,1	10,5	5,3	26,3	36,8	100,0
primary school	Pcs.	54	26	33	60	145	318
	(%)	17,0	8,2	10,4	18,9	45,6	100,0
secondary school	Pcs.	26	14	9	25	54	128
	(%)	20,3	10,9	7,0	19,5	42,2	100,0
high school	Pcs.	88	30	31	76	96	321
	(%)	27,4	9,3	9,7	23,7	29,9	100,0
college	Pcs.	5	1	3	11	11	31
	(%)	16,1	3,2	9,7	35,5	35,5	100,0
university	Pcs.	68	28	33	46	40	215
	(%)	31,6	13,0	15,3	21,4	18,6	100,0
post graduate	Pcs.	6	1	3	2	1	13
	(%)	46,2	7,7	23,1	15,4	7,7	100,0
Total	Pcs.	251	102	113	225	354	1045
	(%)	24,0	9,8	10,8	21,5	33,9	100,0

Reasons of liking or disliking – finding interesting or not finding interesting of TAG highway view within the scope of city silhouette of participators are very important in respect to develop concrete proposal. So 6 pcs photograph were selected from the areas where constitute structural and plant accoutrement are existing. Participators were asked to evaluate these 6 pcs sample photos with 5 points scale liking and finding interesting situations. Pictures were shown to participators separately in order to be scored without comparing.

First structural accoutrement researched was retaining walls. While changing with topography situation, retaining wall, which especially exists in center of city where building density is higher are important accoutrements due to their large area coverage. Concrete retaining wall which is located around Baraj Yolu Duygu Café station where there was a dense settlement on the picture Figure 2 within the scope of research is seen. While retaining wall at Figure 3 was functionally serves the same purpose provides a different view as visually. Analysis results of participators according to their likes and finding interesting situation were given on Table 5 and Table 6.

Retaining wall sample in research area was evaluated as antipathetic and not interesting by the majority of participators. In fact Figure 3 which was provided as an alternative to the participators in research area was liked by majority of participators comparing to the view on Figure 2.

Another subject which remarks of participators were researched in the study was the upper sides of tunnels. While these structures could be constituted obligatory due to topographic reasons they could be constructed in order to prevent the noise effect by highway. These tunnels which are called as “cut and cover tunnels” could be recreation areas for urban fields when planned properly and designed esthetical and they could be habitat integrator corridor generating effect in rural areas.

Table 4: Situation of finding interesting of highway views according to educational background of individuals

Educational background		Level of finding interesting					Total
		I never found interesting	I didn't find interesting	I found moderate level interesting	I find interesting	I find very interesting	
illiterate	Pcs.	8	4	1	2	4	19
	(%)	42,1	21,1	5,3	10,5	21,1	100,0
primary school	Pcs.	122	41	25	60	70	318
	(%)	38,4	12,9	7,9	18,9	22,0	100,0
secondary school	Pcs.	48	25	9	17	29	128
	(%)	37,5	19,5	7,0	13,3	22,7	100,0
high school	Pcs.	156	41	21	51	52	321
	(%)	48,6	12,8	6,5	15,9	16,2	100,0
college	Pcs.	12	3	4	6	6	31
	(%)	38,7	9,7	12,9	19,4	19,4	100,0
university	Pcs.	102	36	22	38	17	215
	(%)	47,4	16,7	10,2	17,7	7,9	100,0
post graduate	Pcs.	9	4	0	0	0	13
	(%)	69,2	30,8	0,0	0,0	0,0	100,0
Total	Pcs.	457	154	82	174	178	1045
	(%)	43,7	14,7	7,8	16,7	17,0	100,0

Figure 2: TAG highway retaining wall

Figure 3: Alternative retaining wall

Upper side view of "cut and cover tunnel" around Baraj Yolu Duygu Café where building density is higher in research area was given in Figure 4. The image is view of several high rise buildings. An upper side of tunnel not belonging to research area exists in Figure 5. Analysis results of participants of liking and finding interesting for these two views were given on Table 7 and 8.

As seen on Table 7 majority of participators like cut and cover upper side view which was given in Figure 4 and existing in research area and they found interesting this view. In spite of that as mentioned on Table 8, they liked habitat integrating tunnel view which was out of area and they evaluated it highly interesting.

Table 5: Liking and finding situations of participators interesting for Figure 2

Liking situation	**pcs.**	**(%)**
I never liked	100	9,6
I did not like	289	27,7
I liked moderately	341	32,6
I liked	175	16,7
I liked much	140	13,4
Total	1 045	100,0
Finding interesting	**pcs.**	**(%)**
I never found interesting	287	27,5
I didn't find interesting	267	25,6
I found interesting moderately	272	26,0
I found interesting	95	9,1
I found interesting	124	11,9
Total	1 045	100,0

Table 6: Liking and finding interesting situations of participators for Figure 3

Liking situation	**pcs.**	**(%)**
I never liked	108	10,3
I did not like	59	5,6
I liked moderately	74	7,1
I liked	297	28,4
I liked much	507	48,5
Total	1 045	100,0
Finding interesting	**pcs.**	**(%)**
I never found interesting	134	12,8
I didn't find interesting	80	7,7
I found interesting moderately	96	9,2
I found interesting	274	26,2
I found interesting	461	44,1
Total	1 045	100,0

Table 7: Liking and finding interesting situations of participators for Figure 4

Liking situation	**pcs**	**(%)**
I never liked	222	21,2
I did not like	284	27,2
I liked moderately	293	28,0
I liked	156	14,9
I liked much	90	8,6
Total	1 045	100,0
Finding interesting	**pcs**	**(%)**
I never found interesting	317	30,3
I didn't find interesting	287	27,5
I found interesting moderately	234	22,4
I found interesting	99	9,5
I found interesting	108	10,3
Total	1 045	100,0

Table 8: Liking and finding situations of participators interesting for Figure 5

Liking situation	**pcs**	**(%)**
I never liked	32	3,1
I did not like	78	7,5
I liked moderately	124	11,9
I liked	129	12,3
I liked much	682	65,3
Total	1 045	100,0
Finding interesting	**pcs**	**(%)**
I never found interesting	62	5,9
I didn't find interesting	103	9,9
I found interesting moderately	150	14,4
I found interesting	161	15,4
I found interesting	569	54,4
Total	1 045	100,0

Final evaluating subject of survey work is remarks and perceptions of participators about greening facilities of highways. This evaluation displays remarks and opinions of participants about how they found green areas around the highways and if they would consider interesting or liked. Evaluation was realized on Figure 6 which both of them belong research area centre strip and lack of green and in a green area in Figure 7.

Liking and situation of finding interesting of participators about the issue was given in Table 9 and Table 10.

Figure 4: TAG highway model cut -cover tunnel

Figure 5: Model cut -cover tunnel

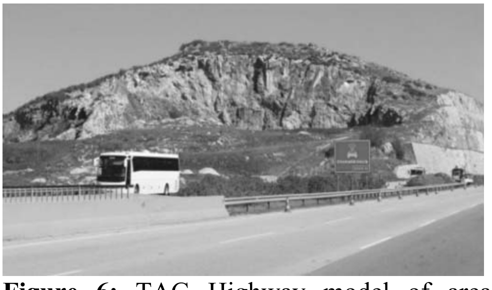


Figure 6: TAG Highway model of area where was not greened

Figure 7: TAG Highway area where was greened

Table 9: Liking and finding interesting situations of participators for Figure 6

Liking situation	**pcs**	**(%)**
I never liked	97	9,3
I did not like	271	25,9
I liked moderately	315	30,1
I liked	202	19,3
I liked much	160	15,3
Total	1045	100,0
Finding interesting	**pcs**	**(%)**
I never found interesting	242	23,2
I didn't find interesting	292	27,9
I found interesting moderately	272	26,0
I found interesting	110	10,5
I found interesting	129	12,3
Total	1045	100,0

Table 10: Liking and finding situations of participators interesting for Figure 7

Liking situation	**pcs**	**(%)**
I never liked	65	6,2
I did not like	227	21,7
I liked moderately	307	29,4
I liked	222	21,2
I liked much	224	21,4
Total	1045	100,0
Finding interesting	**pcs**	**(%)**
I never found interesting	254	24,3
I didn't find interesting	280	26,8
I found interesting moderately	242	23,2
I found interesting	131	12,5
I found interesting	138	13,2
Total	1045	100,0

As seen on Table 9 highway view where there is not green was never liked 9,3% of participators and was liked 15,3 % of participators. In Table 10 where results of Figure 7 were given, 6,2 % of participators never liked this area and 21,4 % of them liked too much mentioned area. For both views finding interesting situations are lower level. This situation shows that highway view constitutes more dominant perception comparing to greening and this view did not constitute an interesting view for participators.

Determination of visual pollution

Expert group was asked to evaluate 6 pictures on survey form within the frames of spatial characteristics (Table 1) and each average point values were given on Table 11. Average results of expert group given on Table 11 were explained on Table 12.

Table 11: Evaluation results of expert group

	well cared	**attractive**	**clear**	**original**	**dense of green**	**natural appearance**
Figure 2	3,14	2,00	3,71	2,28	3,00	2,14
Figure 3	3,42	3,14	3,14	4,14	2,57	2,42
Figure 4	2,00	1,28	2,71	2,00	1,57	1,28
Figure 5	3,57	4,00	4,00	3,71	4,28	3,85
Figure 6	1,85	2,00	2,42	2,28	2,14	3,14
Figure 7	3,85	3,57	4,00	3,28	4,28	4,00

Figure 2 is an image of retaining wall which has an important effect on visual effect of highway. Retaining walls existed on the research area and a sample was seen on Figure 2 were made of concrete materials. Especially due to being in the downtown constitutes the view of persons living around buildings.

Mentioned Figure 2 and similar retaining walls are describes as repelling and dominant artificial elements and ordinary areas and they were not liked by majority of persons around in respect to visual. Figure 3 was broached for expert group and participators as a sample out of research area.

Above mentioned retaining wall was liked by majority of participators as a sample where is well cared moderately, attractive, clear-complexity level is balanced, specific but not green sufficiently, artificial members are dominant. Individuals living within the research area prefer the attractive, original and balanced green texture samples for retaining walls and evaluate the current retaining walls as repelling and ordinary and negative.

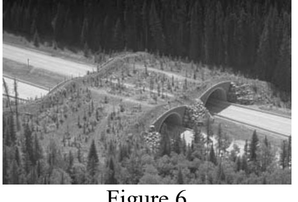
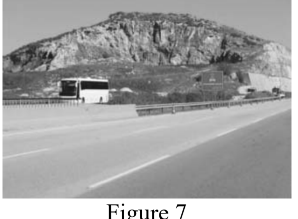
Another essential member which constitutes view of highway is tunnel. Tunnels functions as preventing noise as well as vehicle and pedestrian transportation. Also tunnels are used for passing for species in order to prevent habitat divider and integrate natural life.

Tunnel including in research area and where samples were given in Figure 4 was evaluated as repelling, ordinary, lack of green, dominant artificial members and complex areas by majority of whom living around.

Participators founded sample given out of research area in Figure 5 as attracting, clear, dominant green and natural members, original and preferred.

Centre strips and wayside greening constitutes the most important visual effect of Highway. Fields which were liked and preferred as visual besides their functional feature are the areas where centre strips and waysides greened. Participators didn’t like lack of green, repelling and ordinary road view which was represented in Figure 6 but they wanted the field where green is dominant, has natural members and given in Fig. 7.

Table 12: Evaluation results of expert group about photos.

Figure 2 	Moderate cared Repelling Clear-Balanced complexity level Ordinary Balanced Green texture Dominant Artificial members
Figure 3 	Moderate level cared Moderate attracting Clear-Balanced complexity level Original Not green as sufficient Dominant Artificial members
Figure 4 	Uncared Repelling Complex Ordinary Lack of green Artificial
Figure 5 	Moderate level cared Attractive Clear Original Dominant green texture Dominant natural members
Figure 6 	Uncared Repelling Complex Ordinary Lack of green Balanced Natural-Artificial members
Figure 7 	Well cared Moderate level attracting Clear Moderate level original Dominant Green texture Dominant Natural members

Legal regulations about visual pollution

There is no legal regulation about visual pollution in our country. But there is a "visual pollution directing draft" which is expected to be published soon prepared by Ministry of Environment and Urbanization. With 1st clause of 3194 volume building code and 8th clause of 29/06/2011 dated 644 volume Ministry of Environment and Urbanization, organization and duties delegated legislation (o) article purpose is: "To determine necessary legal and technical basis in order to prevent applications which cause visual pollution in settlement area on buildings and similar structures by considering urbanization and urban esthetics in order to constitute a regular urban environment".

On draft mentioned above generally the below mentioned items have been handles:

*On buildings and advertisement billboards, panels,

*Side views of buildings and similar structures and,

*Construction, waste of junk and idle buildings,

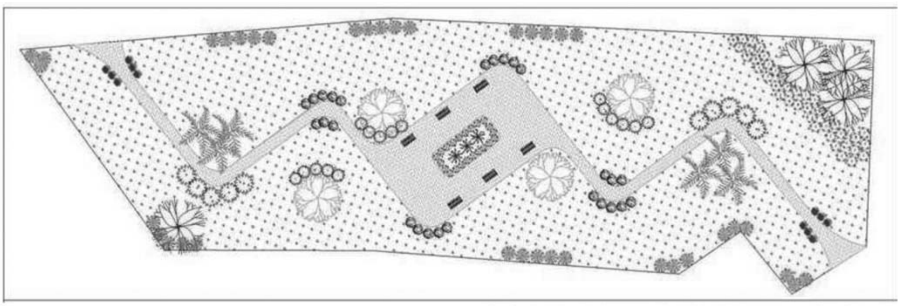
There is no provision about visual effect of roadways in draft directing.

DISCUSSION AND CONCLUSIONS

Transportation come one of the requirements of humankind by increasing population, developing cities and technology. As in many other countries roadways are the most preferred physical investments of sector in our country. Increasing roadway transportation cause several problems. Accordingly one of the problems of urban areas are visual pollution as (Cercleux et al., 2016), (Jiang & Kang , 2016), (Hamersma, 2014) mentioned. Roadway could cause negative visual effect due to dividing the city, material selection or uncared view. These effects are seen significantly in dense population areas. The significant sample of one of these highways is 17 km route of TAG highway which rides city center of Adana. After opening urban traffic, city developed towards the highway and population was increase around the TAG highway. Result of this research showed that more than half of residuals around TAG highway don't find the view of highway interesting but like. This situation explains the population density in this area. But the significant relationship between level of liking highway view and educational background, as long as the educational background increases highway is not considered as a positive view. While individuals who generally reside in research area find view of highway positive, they liked the submitted recommendations more than current samples.

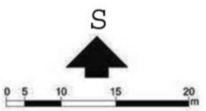
First researched structural accoutrement was concrete retaining wall which is located around Baraj Yolu Duygu Café (Figure 2). In consequence of expert survey evaluation (Table 12), this field was founded moderate level cared, repellent, clear-balanced complexity level and green texture, dominant ordinary and artificial members and expressed as antipathetic and not interesting field by majority of participators. In consequence of expert survey evaluation (Table 12), participators prefers areas where retaining wall located at least with moderate level cared, attracting, clear and original in respect to be visual. Above mentioned areas are located in city center and cover narrow areas and cause either higher maintenance costs or construction of retaining walls. Accordingly having positive visual effect of inner city structures and similar accoutrements will affect visual effect of highway. It was recommended to use well cared, original, dominant green structural fittings which were given on Figure 3.

Another structural accoutrement is the fields over cut and cover tunnels on highways. Main distracting reasons of people living around the highway is noise pollution. Either depending on real topography or up sides of cut and cover tunnels which were constructed in order to prevent noise pollution have significant effects for whom living around the highway. Up side of cut and cover tunnel named Fehmi Özeltürkay (Figure 4) which is located around Baraj Yolu Duygu Café in research area is uncared, repellent, ordinary, lack of green (Table 12) has negative visual effects for who living around. While mentioned cut and cover tunnels could have effects as preventing habitat dividing for rural areas, consisting habitat integrating corridor, they could be designed as recreation areas as Fehmi Özeltürkay cut and cover tunnels model in urban areas. By integrating recreating and urban tissue with highway, in order to increase the comfort of urban people, recommended design was submitted on Figure 8 for the section of this way where road and tunnel doesn't ride.



Trees

	Acer negundo	Dişbudak yapraklı akçaağaç	4
	Lagestromia indica	Oya ağacı	4
	Washingtonia sp.	Saçlı Palmiye	6



Brush and Grass

	Acer saccarinum	Şeker Akçaağacı	6
	Berberis thunbergii	Kadın Tuzluğu	26
	Cotoneaster horizontalis	Yayılıcı dağ muşmulası	11
	Picea pungens	Mavi ladin	12
	Rosa sp.	Baston gül	22
	Sedum sp.	Sedum	50
	Chaenomeles japonica	Japon Ayvası	10
	Thuja orientalis	Doğu Mazısı	37
	Yucca glorosia	Avize Çiçeği	3
	Festuca arundinaceae %30 *Lolium perenne* %10 *Poa pratencis* %10 *Agrostis tenuis* %20 *Agrostis stolonifera* %30		4 kg

Figure 8: Proposal design project for Fehmi Özeltürkay cut and cover tunnel.

Plant materials are as effective as structural accoutrement in addition to functionality over visual effect. Centre strip on research area and fields with green and not –greened near highway side sample pictures (Figure 6,7), participants mentioned that they liked mostly greened fields. In highway city center part centre strip is quite narrow. There was not green works even in sufficient points for planting works. In this area centre strip planting with natural plant cover such as *Thuja orientalis, Nerium oleander, Hibiscus syriacus, Jasminum nudiflorum, Lantana camara, Myrtus communis, Rosmarinus officinalis, Rosa odorata, Vibirnum tinus, Ligustrum vulgare, Campsis radicans, Ulmus minor* will positively contribute traffic security and visual effect. Irregular and meaningless planting which is far from functionality remarks on highway excavations, filling and chamfers. Due to close of buildings to TAG highway it is difficult to prevent noise pollution and air pollution with planting facilities. But there is sufficient area for providing visual effectiveness and integrating with green tissue. Accordingly constituting planting facilities alongside with highway will positively contribute for visual effectiveness. Natural plant cover of region should be considered by planting works which include firstly bushes than long trees than bushes again. So representing region and decreasing maintenance costs would be provided.

Determination of visual pollution is realized by subjective and nonphysical due to pollution of view can't be measured and determined by quantitative methods as other pollutions. Methodical works to determine visual pollution in developed countries enabled to be use of several new studies as (Kaplan et al., 2000), (Malkoç & Küçükerbaş, 2004), (Özeren et al., 2011) and (Çakçı, 2007) developed by utilizing from (Nasar, 1992). Mentioned new approaches which could be formed according to the purpose of study provided development from nonphysical approaches to concrete approaches. This study could be evaluated as a frame method which was performed to determine visual pollution arising from highways.

As the importance of methodical works for determination and prevention/decreasing of visual pollution, legal regulations are also important to materialize these works. Nonexistence of highways which are one of most important effects dividing habitats and natural areas in the draft directing in our country is a big imperfection.

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Chapter 20

Designing Landscape for Children's Development and Nature Conservation: Mutual Benefit

Aysel USLU*, Pelin KÖRMEÇLİ**

1. INTRODUCTION

Nowadays, natural resources are running out as a result of unconsciously human over consumption. It is essential to bring environmental awareness to community in order to reach nature conservation and resources sustainability goals. This can be fulfilled by acquired environmental awareness starting at early ages. In this context, children have an important role in conservation and transfer of these attributes to future of natural resources.

This chapter is regarding with a landscape design that provides positive attitudes and behaviors to children in nature conservation. This study especially search for outdoor landscape design criteria in child development (motor and cognitive). It also develops outdoor landscape design ideas, and necessity of why and how to do them.

Human development theorists (Sigmund Freud, Erik Erikson, Jean Piaget etc.) consensus on characteristics of childhood which are substantially completed within the period of human development and affecting other periods (Onur, 1995). Therefore, the studies in childhood period have a substantial impact on acquired environmental awareness. Researches and experiences also indicate that access to urban outdoor environment and its quality are important factors for children's development (Kylin, 1999). Marcus and Francis (1998) stated that, quality of outdoor space for children can influence children's development in all physical, emotional, social and cognitive ways.

Outdoor landscape design is consisting of natural elements which have a positive effect on children development. For example, children with symptoms of attention deficit hyperactivity disorder (ADHD) are better able to concentrate after contact with nature (Faber Taylor et al., 2001). Children with views of and contact with nature score higher on tests (Faber Taylor et al., 2002, Wells, 2000), children who play regularly in natural environments show more advanced motor fitness, including coordination, balance, and they are sick less often (Fjortoft 2001,Grahn et al., 1997), they play imaginative and creative play that fosters collaborative skills (Faber Taylor et al., 1998, Fjortoft, 2000, Moore & Wong,1997), children's cognitive development by improving their awareness, reasoning and observational skills (Pyle, 2002) and also reduces or eliminates anti-social behavior such as violence, vandalism (Coffey, 2001, Malone & Tranter, 2003, Moore & Cosco, 2000). Early experiences with natural world have been positively affected by development of imagination and sense of wonder (Cobb, 1977,

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Louv, 1991). It is also stated that wonder is an important motivator for lifelong learning (Wilson, 1997). There are other researches on children who play in nature have more positive feelings about each other (Moore 1996). Similar researches reveal a positive association between outdoors and children development (Cromton and Sellar, 1981).

According to all of these researches results, if children take an active role in outdoor, they would have an environmental awareness on nature conservation and protection. For this reason, landscape design practices have an essential role in gaining environmental awareness to children. It should also be considered to design different activity elements and areas, regarding of each children's development periods. Landscape design suggestions and criteria are determined by these periods.

Raising environmental awareness to protect nature at early ages in children will solve many environmental problems in the future. According to Öztürk Aynal (2013), outdoor activities provide children to gain a broad perspective of life. Raising environmental awareness in children will also enable a holistic approach to solve their problems in the future.

Playing areas where children engage in nature has an effect on children development. Children experience nature in play areas, so they improve positive behavior and attitudes to environment. Children's contact with nature is also contributed to society meaning.

This also provides individual child development and environmental values to become the future stewards of the earth who will preserve the diversity and wonder of nature (White, 2004). Naturalized outdoor play areas design has an important role in development of children. There is a mutual benefit between children and nature. When children playing outside development of life, they can understand natural world. In this way, children experiences in nature possitively influences on the development of their lifelong conservation values (Fig. 1).

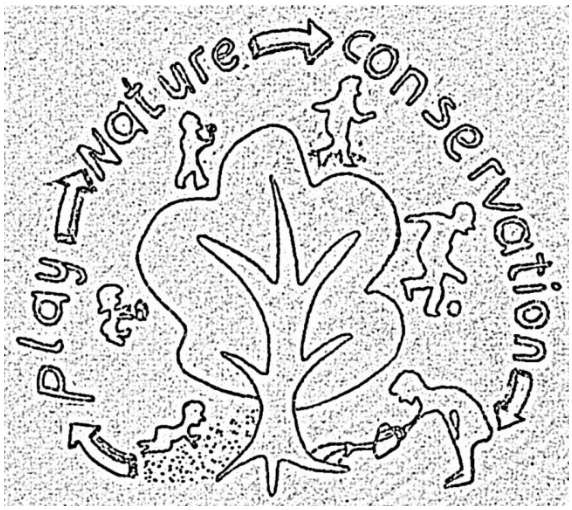

Figure 1. Playing role of children development in nature conservation

1.1. Enviromental consciousness and awareness

Human knowledge and experience related to the environment, forms people's attitudes and behaviors. Humans who are concerned with the impact of environmental issues have been expected to behave caring environment in all their daily life activities (Gadenne et al., 2009). Environmental awareness is individual's sensitivity that reflect life. On the other hand, environmental consciousness can be expressed as the relationship of the human and environment which realize the importance of their presence (TÜBA, 2002). It can also be defined as a level of understanding nature conservation and its sustainable use that occur in individual and political dimensions over time (Yücel et al., 2006). Environmental consciousness is sense of human transferring to life in the intellectual dimension of environmental decisions and policies. This comprehensive concept can change with human personality as well as many other factors. There are also different degrees of internalization of the environmental consciousness for everyone. Table 1. shows internalization level of people's environmental consciousness.

Table 1. Internalization level of people's environmental consciousness (TÜBA, 2002).

First Level	People have a knowledge in problems caused by human-enviroment relations, and they don't want to change their behavior and don't request to change of others behavior.
Second Level	People don't change their behavior, but they request to change the others behaviour
Third Level	People contact with nature as "responsible".
Fourth Level	As well as people behave responsible, they try to ensure that others behave responsibly, warn the resposible state bodies and organize in non-governmental organizations.
Fifth Level	There are financial sacrifices in order to solve environmental problems.

When we compare environmental consciousness and awareness, we understand that these two concepts have different meanings. According to Gülay and Önder (2011), enviromental consciousness consists of environmental decisions, principles, including reviews of thinking, the behavior to transfer these ideas to life and variety of emotions and attitudes with regard to all of these, whereas environmental awareness is to have a general knowledge about the elements of the environment, and to be active in nature conservation. As it is extracted from the definitions, enviromental awareness refers to playing an active role in nature conservation. Enviromental consciousness is understanding of the natural resources values, while enviromental awareness is protection of these values with effective application. Therefore, enviromental awareness will be able to enter our life with landscape design practices in outdoor. It should begin to work primarily with children for entry of such an approach in our society. Making space with regard to sense of design for children in many period of life is important to raise their awareness and encourage.

1.2 .Children's development and landscape design relationship

Landscape features influence physical activity, play and motor development in children. Landscape design practices in natural areas has a possitive impact on children’s motor development (Fjørtoft, 2004). Play areas provide more oppourtunities for children to build their self-esteem, creativity and healty development. Outdoor experience is important for children’s mental and physical health. Engaging children in working together with development of physical skills and stimulate poetic expression, so they begin to understand the workings of the world around them. Creating and managing places where children engage with peers is essential everyday activities in nature. It is also important to interact with family for children development. For example walking in a park or engaging with nature with their peers and families have a positive effect (Moore, 2014). Children's developmental stages is also one of our substantial factor to determine design considerations. According to Çukur and Özgüner

(2008), regarding children's development periods and design criteria are as follows:

- **Infancy period (0 to 12 months):** Child start to understand diversity of nature and sense of environment. It doesn't matter playing in terms of space for this period. For this reason, natural materials that can be recycle, change and develop the five senses of perception and creativity, are essential playing tools for infancy period.

Autonomy period (12 to 36 months): Designing landscape action diameter is 50 to 100 meter. Entrance of the apartment and the neighborhood areas is common unit scale. Natural elements like sand play, climbing wall can used in play areas for this period.

Playing period (3 to 6 ages): Designing landscape action diameter is 100 to 200 meter. District scale is important in desing. For example, children can be responsible for the care of an animal in kindergarten for this period.

Primary school period (6 to 11 ages): Designing landscape action diameter is 200 to 400 meter. Development of imagination and the sense of wonder is important for this stage. It can be designed regular playing areas, hobby garden in nature education for primary school period.

Looking at the children's development periods, it appears that every period’s landscape design is different from each other in terms of the domain. When we determine landscape design criteria for children, we must consider which development age period should be effective in order to increase their enviromental awareness. A research held by the Ministry of Education in Turkey (2009) showed that children develop their motor skills at during the pre-school period (0 to 6 ages) and learn space with playing (URL-1). In primary school period children (6 to 11 ages), they have developed social relationships and shaped their attitudes and behaviors. For this, primary school period is more effective for children environmental awareness increase.

1.3. Enviromental awareness and landscape design relationship

There is a clear connection between quality of landscape design and its effect on environmental awareness. Children's behavior is determined by physical spaces. Design of the physical space with natural elements can possitively stimulates early stages of child development. Designers should consider functional criteria in their project. Especially functionability comes to the foreground in designes for children, because they learn mostly by experiencing nature. Design of spaces have an effect on children's development of capabilities, self-confidence, creativity, and also increase environmental awareness.

Forming the identity of a place in the city, unique architecture, historical sites, plant and animal species and other cultural values are among the factors that should be considered in landscape design. This value has an impact on children's enviromental awareness. A landscape design with a variety of activities like navigation, tracking, recognition will positively affect the development of children.

When we design landscape of open spaces for children, we must consider placement, materials and fittings, security, social control, function, age groupings and social communication criteria (Kirazoğlu et al., 2012). These criteria are major factors to be considered in terms of children's physical, emotional, social and intellectual development.

The other point need to be considered is impact of materials which is used by landscape design in the awareness development. Design with natural elements of the physical space will positively affect the development of children. When changeable natural elements (trees and shrubs, meadow, vibrant colored flowers, soil, wood, rocks, sand, water, etc.) compared to artificial/cultural environment's rigid form, it is important to let children understand the universe, acquire basic experience, creativity and productivity and protect the child's mental health (Ergin, 1982). Natural playgrounds are actually learning areas in design. Children who play each other develop skills and increase susceptibility on what's happening around them (Moore, 2014). Besides these benefits of natural items, they will enable to children contact with the nature. Therefore, natural materials that are used in the landscape design have great impact on children's environmental awareness.

1.4. Enviromental education and awareness relationship

According to Wilson (2011), learning is one of the most important human mental activities that gives new value and ability, where as space is the place that brings people together physically or psychologically. In order to develop children awareness and attitude with acquisition of knowledge and skills about enviroment, it should be environmental education programs and activities for their sensory and research experiences (Karataş, 2013).

Environmental education provides perceive natural environment and developes environmental values and behaviors in a positive direction. The main objective of it can be specified as raise of awareness for use and protection of the nature (Kahyaoğlu, 2009). Environmental education is a process that creates awareness and understanding of the relationship between humans and their many environments – natural, man-made, cultural, and technological. Environmental education is concerned with knowledge, values, and attitudes, and has an aim to gain responsible environmental behaviour (Thomson and Hoffman, 2003). Environmental education is a tool which make people sensitive and gained them enviromental awareness. According to Keleş et al., (2010) nature education that performs individuals positive attitudes, behaviors and thoughts so they will gain holistic perspective by understanding their role of natural processes. Such an individual feel is a part of nature oneself, and be sensitive to the nature protection and development.

In recent years, especially young people, focusing on environmental awareness and attitude towards environmental student groups at different levels of education is seen a substantial increase in research (Tunç et al., 2012). Children should take an active role in the environmental education programs which improve problem-solving in environmental issues. Davis (2007) also stated that demonstrated awareness and attitude of ecological, social, economic, political and spiritual dimensions of the environment enables an individual to find variable and sustainable solutions to environmental problems and concerns.

An effective environmental education involves a cycle of continual improvement that includes the processes of design, delivery, evaluation, and redesign (Thomson and Hoffman, 2003). This is one of the methods that commonly used for nature conservation in most of the countries in the world. According to Atasoy (2006), in order to raise evironmental awareness in children, teacher and all the people have role about that. This task is realized with environmental education model that raise ecological culture and acquire positive environmental attitudes and behaviors in children.

When we look for education model, we can see Bloom's taxonomy in learning process. It was created as a thinking-educating model in 1956 under the leadership of educational psychologist Dr. Benjamin Bloom. It is most often used to improve students higher-order thinking skills. According to this theory, it is necessary to know the areas of learning for intelligibility. The committee identified three domains of educational activities or learning (Bloom, et al., 1956);

- **Cognitive:** mental skills (knowledge)
- **Affective:** growth in feelings or emotional areas (attitude or self)
- **Psychomotor:** manual or physical skills

Bloom determined that it's supporting cognitive behavior taxonomy of learning area consists of learning from simplest to the most complex step by step towards the six cognitive process categories (Fig. 2):

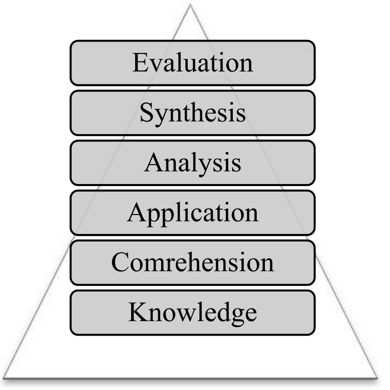

Figure 2. Bloom's learning taxonomy

This learning model can be used in outdoor environmental education programs or landscape design for children development. Children acquire environmental awareness by learning this process (contact with plants, animals etc.), so they understand importance of nature conservation. In this way, effective environmental education that supports the children's development carried out by performing all learning stages processes respectively. Role of education with outdoor experiences is useful for understand and recognition knowledge of natural components. Thus children's experiences and knowledge about nature convert into the protection-based behaviour.

1.5 Landscape design implications in children development

Economic demands affect the social and cultural order in society. It is comprised of similar person in accordance with the same demands in socialization process. In the last century with rapid advancement of technology, the production of the places that serve economic demand reduce their children's natural habitat and restrict to communicate with their environment. Nowadays children and parents living in cities have limmitted oppourtunities to connect with nature. Also, children spend more time watching television and playing computers than they do being physically active outside (URL-2). The lack of communication with their children's physical environment negatively affect their enviromental awareness. To solve these kind of problems for children, the main question to be asked is how to acquire environmental awareness to children. In this context, landscape design implications must be examined for development of children.

Children are important part of the population in Turkey who use urban landscape (Şentürer, 2004). According to Çukur ve Özgüner (2008), thesis on environmental awareness, sensitivity, education, problems and conservation topics discussed in children's behavior regarding with environment. Common think on thesis that "Sensitivity to environment only enhanced by environmental educations in schools" (Özgüner et al., 2007). It is also discussed to educational system. When we look at the thesis and other studies, they commonly focus on the importance of environmental protection and education. If environmental information increases in children, environmental awareness has increased at the same time (Özdemir, 2003).

In recent years, many policies and practices have been developed to raise environmental awareness of children in Turkey. The development of educational curricula and work of various organizations contribute in this process. It is also create awareness about environmental issues and city where children live in. This contributes to children problem-solving skills in environmental issues. The survey techniques on children behaviours are used for defining their environmental awareness. According to Çukur ve Özgüner (2008), "Know, recognize, understand, distinguish, gain skills " words are used in the assessment of unit objectives of Life and Science courses primary stage in Turkey.Therefore, the lessons / units purpose to learning nature and increase awareness. Some techniques (like trip, observation, experimentation and observation) should also been used in schools.

Various projects have been carried out to develop children's environmental awareness. It is pointed that environmental education must start at preschool education. Some activities (seeding, planting, outdoor learning classes, explore the natural conditions expedition trip etc.) have been organized in schools. There are various educational science schools in different themes for children. For example there are architecture, insect and gardening schools which are carrying out projects for children with creative ideas. Thus, children can recognize the landscape and develop positive attitudes and behaviors to the environment.

In recent years environmental awareness education programs has been developing in European countries. Students have relationship based on their location and physical characteristics of the region where they live in. Children were learning by experiencing being at nature in this process, so they have developed a sense of responsibility to the environment (Szczepanski, 2006).

Looking at the example of the environmental education tecniques in many countries, science-technology and personal and social development of some general objectives in the area (showing the nature of interest, wonder curiosity, nature observation, learning the characteristics of living things in nature, awareness-raising on the environment) are used in pre-school education programs in Canada. Science education training (nature observation, experiment, animal care etc.) is commonly used in the United States. Pre-school education programs are included in self-esteem, confidence and social skills the definition of the development of environmental education in Switzerland. Pre-school education with the educational reforms carried out that includes specific objectives related to the environment in Japan (Akçay, 2006). Finnish nature and environmental schools also important objectives of foster a sustainable way of life and environmental responsibility (Jeronen and Raustia, 2009). In these schools, forest sustainability, environmental responsibility and the nature of information are being taught. Thus, it is making the participation of children in environmental practices. Anttilla (2014) is also stated that basic education consist of nine years of compulsory system makes an ordinary classroom an excellent example of the whole society in mini-scale, offering an extensive learning environment for all students.

Professional sector especially those working in field of landscape abroad has intended to devolope environmental education and public awareness on nature conservation with ecological and sustaninable low-cost facilities. It envisages increasing natural areas in city with the ecological principles and designing urban areas with using “natural style" approach (Özgüner, 2003). This design style has been become popular in urban wildlife groups, city farms and ecology parks where can be made practical lessons about the environment and nature (Kendle and Forbes, 1997).

The other landscape design practices that foster children development is carried out in schoolyards. Children spend their most of the time in there. This places are designed with outdoor play activities to delevop childrens knowledge and skills. It is commonly seen playing floor games and walls paintings in schoolyards landscape design. They design with different themes (vegetables, sense garden etc.) or special areas that may come in contact with plants and animals. Thus, children can communicate with nature and this increase their enviromental awareness.

Figure 3. Natural playgrounds, Holland

Children's playgrounds and parks are also effective in raising awareness and learning their environments (about plants, animals, etc).Natural playgrounds design to improve children's cognitive abilities with playground equipment which has a different color, form, texture from other traditional ones (Fig. 3.) There can be adventure playground theme in playgrounds. Designing this concept for children in playscapes, they learn by exploring natural surrounding.

Figure 4. Play Street, Ankara, Turkey

In urban areas streets which located between schools and residential areas, design for reducing driving speeds and increasing levels of safety and creating more efficient and social play areas. This areas design with natural elements, so children experience landscape. There is an example of Play Street in Ankara, Turkey (Figure 4).This space has been created to special play areas for children.

Urban landscape design applications in many countries, especially in Northern Europe aimed to acquire environmental awareness to children. These applications characterized by "Woonerf" or "Home Zone" and they aim to create alternative spaces for children in the city. Woornef system aim to make liveable spaces for children by reducing the speed of traffic or creating playing, recreation areas (Ergen, 2000). "Home Zone" were beginning to be seen as a way of addressing some of these quality of life issues for urban streets. One of the key promoters of Home Zone concept in UK has been the Children's Play Council (CPC) with the idea that street represent an important opportunity to provide a safe space for children to play (Bristol City Council, 2003).
As we can be seen in all areas, landscape design practices which acquire environmental awareness begins with education curriculum and it is supported by a variety of outdoor activities. There have been regulations relating to environmental education in the curriculum for children and this is moved the living area of the application made landscape design in urban spaces. It is necessary to develop landscape designes that create environmental awareness in children. Children play an active role in nature that provide their development in the outdoor landscape design practice.

2. CONCLUSION

Enviromental awareness which acquire at an early age will be effective in nature conservation and develope positive attitudes and behavior in children. All reseaches reveals a possitive association between outdoor activities and children development. Therefore, environmental awareness should been acquired to children with landscape design and they should experince nature in a regular basis.

In urban areas, children's playgrounds, parks, streets, school gardens should be considered as naturalized playgrounds. Museums, botanical gardens, zoos, nature education centers in the city in urban planning have also important role in children's nature education, so we must consider these areas in landscape design. Outdoor classroom for education and training programs should be developed in the schools for play-learning nature. Natural play areas and learning places engage children to environment. It also devolop physical skills and so they begin to understand natural system. Play allows children use their creativity. Children playground areas must design with natural equipments rather than traditional ones. Natural elements in playing area develop their imaginations and pyscial, cognitive and emotional strenght. There is a ship play area example which has different equipment for different activities (swinging, sliding, balancing, jumping, and playing with sand) in it (Fig. 5.)

Figure 5. Creative playscape, Luxembourg

Play-learning environment are designed in ways that provide to recognize nature. They transfered knowledge into the life. It can designed information box to children which introduce plants and animals (Fig. 6. a, b). When children play with these learning activities, they learn landscape and acquire enviromnental awarenes at an early age.

Figure 6. a Insect hotel, Germany b. Plant information box, Germany

We can also design concept areas (sensory garden, insect hotel, floor games etc.) in schoolyards or parks. Moreover designing streets with play-learning areas make liveable spaces for children in urban areas. Recognition of the nature to children, in a way of getting knowledge about landscape. In order to raise children awareness, it can designed poisonous plants units which recognize harmful and different plants in nature education centers (Fig. 7).

It can designed educational ecological areas in public spaces (parks, schoolyards etc.) and its particular uses such as water wall which has rainwater harvesting system (Fig. 8). These children playing areas offer social gathering and increase awareness to their natural surroundings.

Figure 7. Poisonous plants units, Dresden, Germany

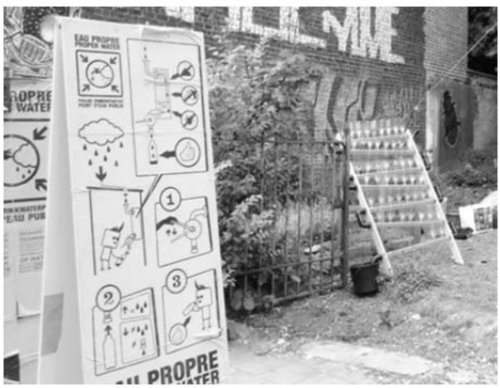

Figure 8. Rainwater harvesting system wall, Brussel, Belgium

It can design gathering spaces to collaborate and solve problems together (Fig. 9). Social play should be given in natural or semi-natural area so they can learn can cause-effect relationships in playing games created for themselves. These spaces have an effect on children’s social, cognitive and motor development.

When we make suggestions for children development, it should be consider each landsacape components and their relationship. Natural design approaches provide to children feel as part of the nature, so children play an active role in nature conservation.

To provide awareness about natural surroundigns in children, it must developed outdoor education with landscape design practices. Chambell (2013) suggest five key spaces

Figure 9. Natural and ecological play areas

(individual, gathering, ecological, active, experimental) that should develope play-learning environment. This invite variety of actions and benefits for children development. Bloom's learning theory stages has also affect in children development. We combine this two design approach to categorize cart in landscape designing suggestions for children development (Table 2).

Table 2. Landscape designing suggestions for children development

Theme spaces	**Develope**	**Design components/areas**	**Affecting learning stage**
1. Individual	Self-discipline Creativity	Natural elements (woods, rocks, recycle materials) seating places, sand pool painting wall, collectin areas (plants etc.)	Knowledge Comprehension Application
2. Experimental	Questioning (reason-result) Curiosity Observation Empathy Creativty Expression	Water wall, sound wall, exploration areas (plants, animals) rainwater harvesting system, habitat gardens, plant harvesting units	Knowledge Comprehension Application
3. Ecological	Nature experience Perceptual Recognition Cognitive skils Problem solving Araştırma	Edible places, plant information box, thematic garden seasonal garden, wooded areas, insect hotel	Knowledge Comprehension Application

4. Active	Develope fine and gross motor Promote fitness Reduce stresses Balance Self-confidence	Dramatic Balancing and climbing logs, climbing wall, different topographical surfaces areas, running paths, adventure trail, maps and paths, cycling road, activity wall	Analysis Synthesis Evaluation
5.Gathering	Coopertation and sharing Communication skills Socialization Problem solving Sense of self experience	Dramatic play area, activity areas, mounds and hills, outdoor classroom, planting areas, nature trips campgrounds	Analysis Synthesis Evaluation

Designed with human hands areas should be develope to love and encourage children to learn the nature applications. In landscape design, all factors affecting the development of children should be considered. Supporting the child's motor development applications that is using different plant species, biodiversity, changes in topography and functional playgrounds, regards as basic components in landscape design. Design alternatives and issues for children in different cognitive and physical properties such as differences in physical accessibility must also be considered. Playing has an affect on both motor and cognitive development of children and so it would provide mutual benefits for the conservation of nature. In order to ensure mutual benefits in nature, it needs to be taken into account designing topics for children's playscapes in urban areas are as follows:

Edible landscapes: Edible landscape applications will provide to contact children with nature in parks and garden planting of urban areas. It can encourage children to connect nature and improves nutrition, related eating habits of vegetable and fresh fruits. It is also stated that Bell & Dyment (2008), children who grow their own food are more likely to eat fruits and vegetables.The using of fruit edible species has been experienced to children eating vegatables from bough in playgrounds or green areas planting (Fig. 10).

Figure 10. Edible landscape encourage children to connect nature and improve nutritions

- **Gender differences:** Girls and boys are attracted different physical places and activities so gender differences should been consider in playgrounds (Acar, 2003). These differences should been created activity areas according to children's gender preferences.
- **The presence of natural elements:** Natural elements (water, gravel, plant, animal etc.), areas that supporting physical activity such as splashing, jumping, running should have been in landscape design.
- **Diversity and biodiversity:** Different habitats that including lanscape features (wetlands, rocky areas, steppe, forests or birds, butterflies, insects etc.), differences in topography and vegetation, will develop biodiversity so they help children to interact with nature. It should been used plant species (edible fruits) to provide habitat for biodiversity in landscape planting design. There has been placed planting species compositions (with different color, bark, fruit, and the body structure) that vary the change of seasson in planting design.
- **Accessibility and sense of place:** It should been strongly focused on issue in landscape design. Designing common areas which have been different combination of group activities for children with physical and cognitive abilities make appropriate use of the socialization of children, so it will make an important contribution in the adoption by the different characteristics of the individual. It should taken into account in different senses of planting composition such as feeling the wind, sense of direction, smell, see variety of colors in children who have plantig composition visially, hearing or physical disabilities or different abilities. For example, a visullay disabled child can feel sense of different organisms in the environment, the bark with tissue differences, detected sense of touch plants feature (velvety sensation of touching the leaves of sumac trees detection, hearing the wind out of the dry fruit capsules). It is possible to develop their emotional skills by detecting differences in sound with artistic and sonorous objects moving in the wind, natural materials as a coating or flooring materials (walking path covered with dried fruit, bark, wood).
- **Spontaneous natural areas:** If some areas (adventure, observation) design in natural style, they enable to children meeting with nature (Fig. 11).

Figure 11. Natural areas enable to children meeting with environment.

Children's play area or open green spaces in the city can design to gain experience by observing in the child's daily life. Natural areas (pile up of rainwater, hosting the steppe flora, wild flower habitat areas) can be also used as laboratory that provide observation of different processes in nature. As a results of research, it is obvious that learning is not only life period but also lifelong process in human life. Children contact with nature and spend time with their families or peers are important for their development.

Natural environments and green outdoors which are designed with natural elements have definitely possitive effect on human health is also vital for the future of the planet in cities in urban areas. According to Frances Ming Kuo usesnthe phrase

"Vitamin G" (G for "green") to capture nature's role as a necessary ingredient for a healthy life (URL-2). Numerous researches held on in the field children's development and environmental design emphasized that being in outdoor which designed with natural elements and connecting with nature is vital the development of children. In addition to studies showed that children who spent their time in that kind of areas have positive attitude and behavior for protecting nature when they are being adult. One of the most important tools is landscape design based on ecological concerns for mutual benefit between nature and children.

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Chapter 21

Landscape Planning and Design in the Fight Against Obesity

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1. INTRODUCTION

People are having less active lives in our times because of the change in the lifestyle. With the purpose of responding to the requirements of the current era, settlements are being designed for vehicles and departing from the human scale. With this reason, relations between the characteristics of the physical outdoor, physical activity and obesity has become the subject matter of many studies.

Obesity, which affects the individuals' quality of life negatively, is directly correlated with physical activity in this regard (Cubukcu *et al.,* 2015). Many urban environments in our times do not support options involving healthy lifestyles and this situation results in an epidemic of obesity (Townshend & Lake, 2009).

The basic objective of this study is to search for an answer to the problematic of "What can be/ must be done as regards the outdoor planning and design in relation with physical activity in the fight against obesity" in Bartın City sample. Recommendations related to planning and design, theory, policy and implementation aiming access to recreation in the outdoors, which is one of the basic activity areas of landscape architects, have been developed as a result of the study.

2.1. Obesity Problem

World Health Organization (WHO) defines health as the physical, mental and social health of the individual as a whole. It is foreseen that obesity will take its place as one of the main factors affecting health together with cardiac diseases and some cancer types in 2020 (Trellis, 2013). Obesity problem is complex in nature. Being overweight or obesity is defined as the excessive fat accumulation in the body. Body Mass Index (BMI) is used to classify being overweight and obesity in adults. BMI is calculated by dividing the weight of the individual in kilograms by the square of height (kg/m^2). Individuals with BMI equal to or greater than 25 are classified as "overweight" and those with BMI equal to or greater than 30 are defined as "obese" (WHO, 2015). BMI of an adult must be between 21 and 23 kg/m^2 (Ministry of Health, 2013a). It is seen that obesity had increased throughout the world more than two folds between 1980 and 2014. Obesity is seen not only in developed countries, but also in underdeveloped countries, and it is more prevalent in urban environments (WHO, 2015). In Turkey, obesity rate in urban areas in males is 20.9% and 40.4% in females; while the same in rural areas is 19.1% in males and 42.9% in females (Ministry of Health, 2013a). While one individual out of 10 was obese in OECD countries till the 80s, this ratio had

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increased two or three folds in 90s and 2000s. While at least one individual out of three is obese in Mexico, New Zealand and USA, at least one individual out of 4 is obese in Australia, Canada, Chili and Hungary. In Asian countries however, only 2% to 4% of adults is obese (OECD, 2014). Based on WHO data, more than 1.9 billion adults 18 years of age or older are overweight in 2014, and of these, at least 600 million are obese. Thirty-nine percent of 18-year olds, however, are overweight and 13% are obese. In 2013 however, 42 million children under 5 years of age are either overweight or obese. About thirteen percent of the adult population of the world is obese in 2014. Six percent of all the mortalities in the world is related to physical immobility and obesity takes the fourth place among risk factors for mortality (Sağlık Bakanlığı, 2013).

WHO and other international organizations are leading the way in the entire world to change the eating habits, gaining adequate and balanced eating habits and adopting an active lifestyle. Policies aiming at reducing obesity by increasing physical activity are included in the prioritized issues of the Turkish Government also, like of almost all the governments. In this frame, programs are being prepared and strategies and activity plans prepared in countries are this information is transferred to individuals. Goals of the Strategic Plan of Ministry of Health for 2013-2017 period include, “To create supporting environments and programs to inform the public about healthy eating, obesity and physical activity and to make them gain regular physical activity habits” (Sağlık Bakanlığı, 2012). In this frame, “Program for Fight against Obesity and Control Program in Turkey (2010-2014)” was prepared to determine new goals and strategies to prevent obesity and accelerate activities. Later, this program was updated and was published in the Official Gazette dated September 2010 and numbered 27714 as the Circular Letter of the Prime Ministry headed “Turkish Healthy Nutrition and Active Life Program”. Goals and strategies aiming at prevention of obesity include “Encouragement of Physical Activity and Improvement of Environmental Factors” under the sub headline “Studies Related to Prevention of Obesity”. The purpose here is “to create, improve and spread possibilities of physical activity to help the individuals in the society in gaining the habit of physical activity.” The objective is, “to increase the physical activity areas for the public before 2017.” Strategies developed to reach this goal include the following: “Spreading the physical activity in the society with the cooperation of local managements, carrying out studies including the required legislation and similar to establish sports facilities and recreation areas and to develop physical activity applications that can be easily made at home”. Physical activity is a tool effective on healthy growth, development and prevention of diseases at every stage of life. Every movement performed using the musculoskeletal system requiring spending energy within daily life is considered as physical activity. There are types of physical activity for everyone including the conditions of physical, mental, hearing or seeing disability. Period, frequency and intensity of physical activity vary among individuals. In this frame, “Guidelines for Physical Activity in Turkey” has been prepared with the purposes of transferring the knowledge about physical activity to the society, being a guide for related experts, developing recommendations in national base and increasing the physical activity levels. In this frame, playing games and having activities to maintain the daily life like housework or gardening are considered as physical activity as well as sporting activities and exercises. Regular physical activities including Yoga, Pilates and TaiChi are activities that increase the flexibility of the body. Physical activity for 60 minutes every day for children, and at least 150 minutes every week for adults with medium intensity are recommended so as to allow the use of large muscular masses. Such activities can include walking, biking, jogging, swimming, and similar, and must be performed by spreading the activity to 3 to 5 days in a week. It is estimated that there will be 800 million elderly individuals, that is, individuals 65 years of age or older in 2025, while the same is estimated as 9 million individuals in Turkey. It has been reported that 10% of the elderly walks, and 15% perform exercise at home (Sağlık Bakanlığı, 2013a; Sağlık Bakanlığı, 2014; Cubukcu *et al.,* 2015; WHO, 2015).

Physical activity is important for individuals at any age and each gender. Active and encouraging environments of living for individuals older than 65 years of age ensure them to go out more often and have more activity. It has been found that the vitality of urban areas enhances active lifestyle in the elderly individuals of every age and gender. Particularly, the urban areas that are inconvenient for walking deprive the elderly from the possibility of physical activity. Sedentary life involves women more as compared to men. However, it has also been found that men are more sensitive against the quality of the built environment. The increase in the elderly population throughout Europe has resulted in focusing in the public health policies on encouragement of healthy activity habits in relation with physical activity. With this reason, relation of vitality of the living environment and whether it is convenient for walking with active aging has been questioned (Marquet & Miralles-Guasch, 2015). Another activity that will increase the physical activity is to participate in urban agricultural activities regularly. Gardening activity is a powerful tool with rather positive effects on both mental and physical health. Adding gardening to physical activity programs particularly for children and the elderly individuals in fight against obesity can ensure that they become more active individuals. Therapy gardens play an important role as an effective tool for healthy growth of children physically and mentally and also in reducing the stress and tendency for violence in adolescents (Potucek, 2003; Trellis, 2013; Davies, Devereaux, Lennartsson, Schmultz & Williams, 2014) .

Increase of free time spent sedentarily with low-level physical activity – "Sedentary Life"– comes in the first place among public health problems. Particularly, watching TV increasingly as a recreational activity is one of the sedentary life behaviors. We see this as a cause of death in many cases as well as increasing obesity. TV watching time is also an important factor (Veitch *et al.*, 2016). The relation between having access to parks and sedentary lifestyle like watching TV has been investigated as the subject matter of studies. Based on a study carried out on women in the USA and Australia, women living in areas with multiple parks close to their homes have more physical activity and their intents to watch TV more than 4 hours a day, which is a sedentary behavior so unhealthy to cause cardiac diseases and death, is reduced. This situation ensures lower BMI in women. Staargarrd *et al.* (2014) have found in a Danish sample that sedentary recreational activities are seen more in settlements with less green areas (Veitch *et al.*, 2016). Relation between the use of the existing parks, time passed dependently to screens like computers/ tablets and obesity must be investigated in future studies, especially for youth (Veitch *et al.*, 2016).

In a study carried out by the Ministry of Health in 2011, it has been found that 87% of women and 77% of men in Turkey lacked adequate physical activity. Turkish Nutrition and Health Study has also reported that 58.4% of the children in 6-11 age group do not have regular physical activity. Children in this age group pass 6 hours sedentarily with reasons including TV, internet, studying and similar (Ministry of Health, 2014). Watching TV, which is a sedentary activity causes obesity. The rate of obesity in individuals who watch TV for 3 hours or more is greater as compared to individuals watching TV less than 3 hours (Booth *et al*., 2005).

States have started to develop various tools against obesity, which increasingly threatens public health in the recent years. One of these tools is the obesity tax. Obesity tax is defined as, "Imposing tax on foods and beverages that cause accumulation of fat in the body so as to impair health and classified as unhealthy and imposing tax on individuals with BMI values are higher than normal". The objective of obesity tax is to ensure increases in prices of unhealthy products and consequently, to reduce the demand for such products. Obesity appear to be not only a health problem, but also an economical problem by lowering the quality of life of all the individuals at different ages and gender, its adverse effects that shortens life and economical costs arising from all these problems. Furthermore, the negative financial burden caused by obesity is met not only by the obese individuals, but also by the non-obese individuals. With this reason, it has highlighted in several studies that public initiative is required in fight against obesity. Various programs including taxing is also recommended to governments by international organizations also [WHO, European Union (EU), OECD, etc.]. It is seen that groups with lower incomes necessarily tend to unhealthy foods with lower prices and high calories. However, it is foreseen that preferring such unhealthy foods with lower prices and high calories will cause health problems with high costs in the mid and long term. Educational and advertising works must be carried out to raise the awareness in the society for public health and economic aspects (Ayyıldız & Demirli, 2015; Gökbunar, Doğan & Utkuseven, 2015). Minister of Finance have stated in the 5th Izmir Economy Congress that consumption tax can be imposed on products that increase the rate of obesity and consequently, health expenditures (Kalkınma Bakanlığı, 2013).

2.2. Relation of Obesity with Physical Activity

Changes on the environment and social structure, urban planning, consumption of fast foods, and non-supportive policies on subjects including agriculture, transport and marketing are effective on obesity. Being overweight and obesity can be prevented by limiting the fat and sugar consumption and having a balanced and regular diet with increased vegetables, fruits and legumes and having continuous physical activity (WHO, 2015).

There are numerous international studies questioning the relation between obesity, which is a social problem, and physical activity and living environments of individuals (Booth et al., 2005; Brownson et al., 2009; Wilhelm Stanis et al., 2014; Zhang et al., 2014; Cubukcu et al., 2015; Gomez et al., 2015; Lee et al., 2015; Marquet & Miralles-Guasch, 2015; Townshend& Lake, 2009; Xu & Wang, 2015; Veitch et al., 2016).

Individuals with different characteristics like age or gender have been focused on in some of these studies. In one of these studies, the relation of physical activity rates and obesity rates in young individuals with the access to outdoor recreational areas (parks, forest areas, natural reserve areas, roads closed to motor vehicles, etc.) were studies (Wilhelm Stanis *et al.*, 2014). In another one, relation between the vitality and convenience /inconvenience for walking of the living environment with active aging was investigated (Marquet & Miralles-Guasch, 2015).

Lack of physical activity, sedentary life behaviors, gaining excessive weight / becoming obese of individuals have resulted in focusing on arrangements in living environments and particularly on urban designing and having access to recreation possibilities. Landscape planning and design of public parks providing the possibility of physical activity must be attached importance to provide protection from obesity. Effects of urban settlement areas /environment on physical activity and obesity are important. It has been found that individuals living in settlements having regular roads with better esthetic qualities walk more regularly and therefore have lesser abdominal obesity. It is seen that pedestrian roads/ pavements and areas with attractive sightseeing have higher walking capacities. It has been found that more individuals have regular physical activity in those areas and consequently have lesser obesity. Walking and regular roads have provided positive health outcomes. High blood pressures and diabetes, which are risks caused by obesity, appear to be less in environments convenient for walking. In conclusion, environments that are convenient for walking are important tools for health in urban areas (Lee *et al.*, 2015; Veitch *et al.*, 2016).

Factors influencing the relation between physical activity/ health and parks can be listed as closeness, size, access and availability. Parks and pedestrian roads provide significant infrastructure possibilities as regards physical activity for both young and adult individuals. According to Rosenberg *et al.* (2009), pedestrian roads are importance as they encouraged physical activity and protected the healthy body weight, and they must be arranged so as to attract more people (Wilhelm Stanis *et al.*, 2014).

In one of the studies, it has been investigated if the relation between driving environment and obesity varied depending on the regional urbanization level (Zhang *et al.*, 2014). It has been found that the relation between driving environment and obesity varies depending on the regional urbanization level. Urban and regional policies must improve/ rearrange the existing vehicle-dependent environment and must support healthy behaviors and development of healthy living areas (Zhang *et al.*, 2014).

Relation between the characteristics of the urban environment and physical activity has been questioned in 10 different cities in Latin America with high populations. Socio-political hindrances and facilitators have been determined in the scope of urban interventions related to active living. Some characteristics of the public environment including access to public transport, diversity of area use, presence of infrastructure related to biking, possibilities of short trips, public recreational possibilities and safety of traffic are related to physical activity. Public transport, public areas allocated for recreational activities and presence of the infrastructure for biking can increase physical activity. Environmental factors affecting biking positively can be listed as special biking lanes (on- and off-road), initiatives related to "Safe School Routes", short pleasure trip routes, being separated from the traffic, access to the biking road within a short time, green areas or recreational areas along the biking road. Activities that will encourage the use of bicycles include organization educational activities to spread its use, developing the biking infrastructure, providing training activities on biking, possibilities of hiring bicycles free of charge, and using bicycles for transport to workplaces. Encouraging biking for transport means the construction and improvement of biking roads, biking roads/traces, and development of bicycle parking lots and bicycle sharing programs. Examples of programs accepted as good practices include "Ciclovia Program" and "TransMilenio in Bogota" (BusRapid Transit System-BRT) (Gomez *et al.,* 2015).

Higher population intensity, good connections between avenues, pedestrian areas, pavements, wider areas with diversity of use, attractive in the esthetic sense and safe spaces are the positive characteristics of outdoors for fight against obesity. Inhabitants of settlements with these properties have high physical activities and low BMIs. In contrast, settlements with monotype use and little or no shopping possibilities or with lacking similar services, areas with pavements of low/ weak levels, monotonous, inadequate lighting and unattractive landscape take individuals away from physical activity and have adverse effects on health. Upon comparison of these two groups, it is seen that quality and quantity of green areas are important. Giles-Corti *et al.* (2005) have stated that having access to attractive green areas can be the key in encouraging having more exercise. It has been found that physical activity increases in proportion with the quality of the landscape in the living area (Booth *et al*., 2005; Townshend & Lake, 2009).

3. MATERIAL and METHODS

The Bartın City was selected as the study area. Bartın is located in the Western Black Sea Region in Turkey at 32°-33' Eastern Longitude and 41°-53' Northern Latitude (Bartın Valiliği, 2008). The basic objective of the study was to develop recommendations in the sample of Bartın City for the planning and design of outdoors in relation with physical activity in the fight against obesity. The study was carried out in the frame of a methodology comprising three stages. Reviews on the international and national literature were carried out in relation with the subject matter in the data collection stage, which is the initial stage. Organizations that will be responsible for or that will cooperate have been determined under the "Turkish Healthy Nutrition and Active Life Program (2014-2017)" created to provide for access to local data in the frame of goals aiming at prevention of obesity. In this frame, Bartın Municipality, Bartın Provincial Directorate of Environment and Urban Planning, Bartın Provincial Directorate of National Education, Provincial Directorate of Youth Services and Sports, Bartın Public Health Institution and Bartın University, all considered as relevant for the subject matter of the study, have been interviewed with. Data have been obtained from the relevant institutions as well as data related to activities of Nongovernmental Organizations about their activities have been obtained from the internet. There are a few limiting factors in this study including the lack of adequate inventory in the institutions related to the subject matter of the study and inadequacy of cooperation between institutions for data flow. Therefore, having access to restricted data can be stated as the basic limitation of this study. In the second stage, which in the analysis and evaluation stage, all the data have been associated to the concepts of "Healthy Cities, Disabled-friendly, Active Aging, Social Gender Equity and Prioritized Pedestrian-Bicycle Transport" from a perspective of professional discipline of Landscape Architecture and the issue of fight against obesity has been analyzed, and evaluated. In the last stage, results related to the outdoor planning and design in fight against obesity in this frame for the Bartın City have been determined, and recommendations have been developed.

4. RESULTS AND RECOMMENDATIONS

Results obtained from institutions related to obesity and physical activity in the scope of fight against obesity and from relevant NGOs in Bartın locality are summarized below. It is seen that studies related to fight against obesity have been intensified starting from 2010. It has been found that cooperation between institutions has not been ensured adequately and institutions continued with their activities within their structures in general.

The Strategic Plan for the Period of 2015-2019 of the Bartın Municipality includes the increase of the amount of active open green areas/ number of parks and construction of a zoo. Municipality has constructed 104 parks in different sizes throughout Bartın. Three of these parks have racetracks. Thirteen parks have sporting areas for basketball, volleyball and tennis. All the parks have play elements for children and conditioning tools. Construction of a new park is planned on an area of about 20 dönüms (1 dönüm is approximately 920 sq. m.). Spaces for physical activity are being planned in this park including sporting areas, children play grounds, biking and walking ways and rinks. Furthermore, the Directorate of Culture and Social Works of the Municipality is organizing biking contests and nature walks in the scope of Bartın Strawberry Festival with the supports of the Biking Club and Provincial Directorate of Youth Services and Sports. Aerobic, stem and zumba courses are arranged for women for six-month periods. Volleyball, basketball, tennis, table tennis and wrestling courses are being organized in summer schools and winter schools. Municipality has basketball, table tennis and wrestling teams in addition to the increases in had made in areas supporting the physical activity. Subjects including scuba training, sailing club and aids to sporting clubs are in planning stage (Bartın Valiliği, 2014).

Provincial Directorate of Environment and Urban Planning organizes activities mostly for the purposes of creating and increasing the awareness of protection of the environment. In this scope, photography and painting contests, kite festivals, projects including "My Clean Environment" and 2015 biking tour activity has been organized. This activity has been realized with the support of the Provincial Governorship, and participations of the Provincial Directorate and Bartın Pedal Comrades Biking Club Association. The "Inner City Biking Tour" of about 6 km has been organized in this scope. This activity carried out with the purpose of encouraging biking for a livable clean city cleaned from environmental pollution like air pollution and noise pollution indirectly provides individuals with the possibility of physical activity (ÇŞB, 2016).

"Nutrition-Friendly Schools Initiatives (NFSI)" program of WHO has been initiated in Turkey through the protocol signed between the Ministry of National Education and the Ministry of Health in 21.01.2010. In the scope of the headline, "Encouraging a Balanced Diet and Regular Physical Activity Habits for Fight against Obesity in Schools" in section "Studies Related to Prevention of Obesity" in the Turkish Healthy Nutrition and Active Life Program, Ministry of Health and Ministry of National Education have signed the protocol for "Nutrition-friendly School Program" in 20.09.2013. Later, the Program Implementation Guidelines have been updated and the Additional Protocol has been signed and put into force in 09.02.2016 (Milli Eğitim Bakanlığı, 2016). The objective of the Cooperation Protocol for "Nutrition-friendly Schools Program" is, "to encourage schools of the Ministry of National Education throughout Turkey in the subjects of nutrition and active life, to support good practices in this subject and to improve the school environment and health of students" (Sağlık Bakanlığı, 2013b).

Schools must meet certain standards to be "Nutrition-Friendly School" and to have this certificate. The Application Guidelines include these standards and the points they will gain when they meet these standards. As regards the subject matter of the study, the physical activities held together with the sportsmen/women in famous places particularly in gym courses to encourage physical activity and to chat with them, rewards being presented by such persons, carrying out maintenance and repair works related to plants within the school garden together with students, establishing folk dance or dance groups and organizing nature trips have been included. Standards required to obtain this certificate include presence of sporting areas like basketball and volleyball in the gardens of schools for any age group of children and spaces for traditional children's games like slide or "snatch the handkerchief", and children's play tools (Sağlık Bakanlığı, 2016). Two schools have Nutrition-friendly School Certificate in Bartın as of 2016; and 15 schools have applied for this certificate (Milli Eğitim Bakanlığı, 2016).

Projects are being implemented by the Bartın Governorship, Provincial Directorate of Youth Services and Sports under the instructions of the Ministry aiming physical activities, and the project "Fight against Obesity and Healthy and Active Aging" that is open to all the public has been participated in as a stakeholder on 01.04.2012. In this scope, activities including walking, biking, aerobics, etc. have been held. The project "Plenty is Where Movement is" open to all the public has been started on 21.10.2012 with the purpose of closing the summer activities and initializing winter activities. In the frame of this project, branch sports such as volleyball, basketball and tennis and biking tours have been organized. With the purposes of spreading the sports culture in the country and allowing individuals making healthy sports, the large-scale "Run if You Can" project with stating date of 01.09.2012 has been initialized. Activities including volleyball, basketball, tennis, walking and biking as physical activities have been carried out, and are still going on. The "Workplace Exercises Project" aiming at teaching desk-bound exercises in the interiors to individuals who are immobile during the daytime because of their desk-bound jobs was initialized on 01.01.2013. In the scope of the project, information was provided in relation with which movements should be performed for how long and which frequency without staying immobile at the desk. With the purpose of meeting the sporting and sports area needs of the public, "Sporting Bazaar Project" was initialized with the participation of public on 01.01.2013. It is aimed at market places of the city will be used for activities including aerobic or step on days that the market place is not used as the district bazaar. The project "I am Sporting with My Family" was initialized for women and men 25 years of age or older with the purpose of ensuring that the team spirit will be experienced by family members on 09.05.2016. The purposes of this project is to ensure that family member will have sporting activities altogether, to improve physical and mental health, to minimize the time spent by adults and children using the communication tools including computers, tablets and phones, and to increase the solidarity between the family members and time spent by the family members together. In the scope of this on-going project, activities including nature walks, biking tours, basketball and tennis are held (Bartın Valiliği, 2016).

The year 2014 was announced as the "Active Life Year" by the "Provincial Adequate and Balanced Nutrition Committee" having activities in Bartın in the scope of works of the Turkish Healthy Nutrition and Active Life Program (2014-2017). Activities that can be held with the cooperation of Ministry of Health and relevant institutions in the fight against obesity have been determined by the Committee (Bartın

Valiliği, 2014). In this frame, walks and biking tours have been organized in nature and in the city, and are still being organized. These activities are held one or two times a month. Women were included in aerobics/ fitness activities accompanied by trainers in sporting areas one hour a day and three days a week. Bartın Governorship, Directorate of Public Health is organizing biking tours and nature walks with the participation of public together with NGOs (TEMA, Pedal Comrades, etc.) and public organizations every 15 days. In this frame, a biking track of 1700 km has been constructed in Kozcağız by Bartın Municipality to encourage active life in 2014.

As regards the fight against obesity in Bartın locality, the EU project headed "The Outdoor Planning and Design to the Fight against Obesity" and numbered 2009-1-TR1-LEO03-08178 has been implemented by Bartın University. This project has been supported in the frame of EU Vocational Education Program Leonardo da Vinci Mobility Project. The purpose of the said project is to stress the importance of measures that must be taken by persons in decision-maker, expert and academician positions in public entities and organizations and supportive policies against the threaten of obesity gradually increasing in Turkey day by day. In this context, it will be possible to prepare the infrastructure for the joint works of institutions that plan, design and implement cities and to develop a joint action plan for the fight against obesity. In addition, requirement of healthy and balanced nutrition has been stressed in the project together with the necessity of continuous and regular physical activity. Increasing the ecologic culture capacity for health nutrition and having initiatives to encourage urban agriculture has been recommended (Bartın Üniversitesi, 2010).

Bartın Pedal Comrades Biking Club Association was established in Bartın in 2014. The objectives stated in the establishment bylaw of the Association include the following: "…To enable and develop activities such as transport, going on vacations, tourism, tours, festivals, trips, races, etc. with bicycles, and to support persons and organizations having activities in these areas". Subject matters of studies foreseen to spread biking in relation with the fight against obesity to be implemented by the Association are included in the bylaw. Bartın Pedal Comrades Biking Club Association has organized 3 "Bartın Biking Festival" on 23-25 August 2013, 29-31 August 2014 and 22-25 October 2015 (Pedaldaşlar, 2014). An activity with the theme "Mobility for Health, Biking for Mobility" has been organized by the Association together with Bartın Public Health Department on June 22, 2014.

Lack of physical activity, nutritional habits, biological factors, socio-cultural factors and demographic factors are effective on obesity. Obesity has adverse effects on both public health and on the economies of countries (Sağlık Bakanlığı, 2013a). Developing the public tools including obesity tax used by governments in their encouragement/ discouragement policies in fight against obesity will be beneficial. Spreading of slow-food restaurant chains selling healthy foods with local properties must instead of fast-food be ensured like in Europe. In this regard, tax can be imposed on fast-food restaurants and advertisements that cause increase in obesity instead of imposing tax on fast-food products. This will particularly be effective on fight against obesity in children and adolescents who prefer fast-food store chains. As an effective tool related to obesity tax, for example, the tax to be imposed on unhealthy foods with high energy can be appropriate to prevent over-consumption. To the contrary, it has been found that BMI increases are lower in regions that prices of vegetables and fruits are low. A taxing system that will reduce the prices of healthy foods and increase prices of unhealthy foods is recommended for fight against obesity. Obese individuals and smokers live less as compared to others. With the purpose of fighting against the problem of gaining weight seen in individuals who quit smoking, imposing high taxes on tobacco products will support fight against obesity. Like indication of the potential damages of smoking on health of smokers on packages, diseases caused by unhealthy foods (containing sugar, salt and fat) must be written/ drawn on fast-foods to raise the awareness of public. Health insurance and social security companies can make their health policies sensitive for obesity and thus can contribute to the fight against obesity indirectly (Ayyıldız & Demirli, 2015; Gökbunar, Doğan & Utkuseven, 2015).

The following recommendations have been developed for landscape planning and design for the Bartın City in the fight against obesity:

Increasing the physical activity will ensure decreases in healthcare expenditures and economic expenses. Physical activity has positive effects on physical, mental and social health and future life. It increases the quality of life, and is effective on the prevention of obesity and chronic diseases. Furthermore, activities such as biking or walking will indirectly contribute to the prevention of environmental pollution. The most important of all is to make physical activity the lifestyle. Central and local managements have important duties and responsibilities in the enhancement of qualities and quantities of the physical spaces for such activities. With this reason, public policies included developed considering health in the front place and activities must be held to strengthen the awareness to balanced and regular nutrition and having physical activities. In this frame, local managements must develop policies for the construction of safe walking and biking roads, to reduce the speed of the traffic, to create pedestrian roads close to vehicle traffic and to create physical activity areas for all the ages, gender and disabilities; and must carry out studies related to planning and implementation with the relevant institutions, organizations, NGOs and universities. Implementation of joints works by local managements, Ministry of Environment and Urban Planning, Ministry of Youth and Sports, Ministry of National Education and relevant departments of universities such as Landscape Architecture are important for the accurate urban planning to spread physical activities (Sağlık Bakanlığı, 2014). With this purpose, biking and walking courses must be created with transport and recreation purposes in the outdoors, and factors including safety, lighting, sound, light, shadows and resting must be taken into consideration in spatial designs to be created. Each year, the period of 16-22 September are celebrated as the "European Mobility Week" in Europe. Activities are held regularly between these dates in Bartın also.

Different age groups, genders and disabled individuals also must be taken into consideration and participation of the entire society in activities must be allowed. In this frame, requests/ needs of children, women, elderly individuals and disabled individuals must be taken into consideration in planning and design of outdoors. Since the elderly population is increasing globally and walking is the safest/ most proper physical activity type for the elderly, it is recommended that planners must focus on the creation of walkable environments that will render active mobility attractive. Physical activities and other activities in exterior spaces must be organized according to the needs of women also in relation with the social gender equity. In this frame, an action plan has been suggested for the year 2010 aiming at encouraging women sensitive to social equity for Bartın to have physical activities. Improving the quality of life in Bartın has been aimed at by improving the physical and social infrastructure in the decisions related to the plan under the principles of Healthy Cities Union and the concept of social gender equity (Açıksöz & Uslu, 2010). According to this action plan, physical and social infrastructure must be improved and activities must be organized to support the plan. It has been stated in numerous studies that security is an important factor for the relation between physical activity areas and individuals having physical activities. Particularly women prefer activities such as walking when they feel safe in the settlements they live in (Townshend & Lake, 2009). Adequate lighting must be provided for the open green areas of the Bartın City, and security measures must be increased.

The infrastructure required by individuals with physical, mental, visual or hearing disabilities must be established to benefit from physical activity possibilities and providing access to all such areas. Physical activity areas must be created for individuals with visual, hearing, physical or mental disabilities so as to allow them socializing with other individuals. The safety measures and architectural measures must be taken for the individuals with visual disabilities. Walking routes with white walking sticks, activities and activity areas must be explained with Braille alphabet and audio explanations. For the individuals with hearing disabilities, explanatory information must be provided with lighted panels and cards with illustrations. Access of physically disabled individuals to all the open green areas must be ensured. Informing signs showing the metering and the calories burned must be positioned every 100 m. With this purpose, activities including swimming, walking, biking, pushing, swinging and straining, yoga exercises and urban agricultural activities like therapy gardens must be added to the open green area system of the city so as to ensure the participation of the disabled.

It is thought that urban agriculture in future cities will take an important place both spatially and an occupation for individuals. It has been found in a study carried out in Bartın that "Urban agriculture in Bartın has cluster characteristics and has future growth potential" based on Cluster Growth Theory (Açıksöz, 2009). Based on this study, the existing urban agricultural potential in Bartın must be made use of improving the physical and mental health like in therapy gardens.

Together with healthy nutrition, bringing children in the habit of physical activity is also one of the most important tools in prevention of the future obesity epidemic. Creating standard playgrounds will not suffice for this. Especially, traditional (old) street games must be encouraged for an active life and their spreading must be ensured. For example, walking routes, children's bowling, free open area games, biking areas, sand pool, traditional children's games (take-and-give, puss-in-the-corner, hopscotch, hide-and-seek, snatch-the-handkerchief, jumping rope, line games, etc.) and rinks can be recommended for children in the age group of 2-7, and tennis, basketball, volleyball, Yoga areas, and the like can be recommended for children in the age group 8-9.

One of the regulations to be implemented for health and safety of the public includes the regulations recommended for the educational institutions and their vicinity: Prohibiting the advertisements of unhealthy foods in the vicinity of educational institutions, banning fast-food restaurants, selling skimmed milk, fruits and vegetables and similar healthy foods instead of fast-food and junk foods, imposing high taxes on fast-food restaurants established in vicinity of educational institutions or advertisement panels and ensuring them to locate in greater distances can be an important factor to do this (Gökbunar *et.al.* 2015). Pratt (2012) recommends that, in order to defend the criticized obesity tax, such taxes should be analyzed as regards benefit and cost, regulated, implemented and the effects should be analyzed with studies, and to create the public vote in favor of obesity taxes (Ayyıldız & Demirli, 2015).

The responsibility for the studies on the legislation related to “increases, in the taxation of unhealthy foods that should be consumed in small amounts” in the strategy developed for fighting against obesity in “Turkish Healthy Nutrition and Active Life Program” implemented by the Ministry of Health has been delegated to the Ministry of Finance (Sağlık Bakanlığı, 2013a).

The reasons for inability to use actively some of the open green areas included in Development Plans in Bartın is the green areas being private property and recommending locations with surface inclinations greater than 40%. Additional budgets are required with this reason. Areas with inclinations smaller than 30% must be preferred to be used as open green areas in Development Plans. This way, Municipalities with limited budgets will provide economic application possibilities (Çelik & Açıksöz, 2010). In this frame, topographic structure of the city that limit the physical activity possibilities must be taken into consideration particularly when planning and designing open green areas in new settlement areas.

The following measures must be evaluated to understand the effects of the living area on physical activity: High intensity, strong connections, high level of diversity of area use, closeness to the recreational possibilities on the seashore and river banks, distance to the nearest park, number of parks and size of park areas, quality of services connecting one location to another, closeness of the location intended to reach from home and presence of a rout that is directly accessible, walkability, quality of the infrastructure to pavement-biking road–pedestrian road, diversity of the landscape along such roads, architectural details, natural and cultural characteristics including quality of the landscape. In this regard, future studies must question the level of effects of esthetic properties of the area with the motivation to have exercise in the daily life and how this motivates individuals (Brownson *et al.*, 2009; Townshend & Lake, 2009; Veitch *et al.*, 2016).

Car addiction has a strong relation with obesity particularly in metropolitan areas. Transport and urban infrastructure studies must be attached importance to encourage walking and biking for transport to work, shopping and recreational activities in order to encourage individuals to have physical activity. Urban and regional planning policies and applications must be developed to reduce driving motor vehicles and to encourage mass transport vehicles as well as walking and biking. In parallel with this, the existing driving spaces must be re-arranged considering the level of urbanization. Correct behaviors of individuals must be supported in relation with health to provide protection from obesity, and studies required for planning, design, policies and implementation must be carried out to create a healthy society.

5. CONCLUSIONS

Obesity is a problem not only affecting the physical and mental health of individuals, but also adversely affecting the economic and social structure also. Fight against obesity must be handled from the perspectives of different disciplines involved in the outdoor planning and design such as landscape architecture, urban and regional planning as well as the disciplines related to public health and food intake. Dimensions of the obesogenic environment must be determined in the international, national and local levels. Environments related to both physical activity and food must be changed/

transformed to support more healthy behavioral modes. Ensuring easy access to safe and good quality open green areas and improving the landscape quality will increase number of individuals who are exercising for recreational or transport purposes. Cooperation must be ensured between relevant institutions and organizations in order to reduce/ overcome the obesity problem in the society, and international, national and local organizations including the public and private sectors, nongovernmental organizations, professional chambers, media and similar must act jointly in collaboration. Joint efforts must be exerted in fight against obesity and cooperation must be ensured between relevant public entities and organizations and equivalent entities in international scale. Urban open green areas provide the public with the possibilities of having activities and an environment for socializing. Grounds must be set to allow not only males and healthy individuals to participate in activities, but for the participation of the entire society by considering different age groups, genders and the disabled individuals. In this frame, concepts including "Healthy Cities, Disabled-friendly, Active Aging, Social Gender Equity, Transport with Pedestrian and Biking Priority" must be taken into consideration in studies related to the outdoor planning and design in the fight against obesity.

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Chapter 22

Evaluation of Design and Liveability from a Critical Viewpoint in Çanakkale Waterfront Area

Melda AÇMAZ ÖZDEN[*], A. Tolga ÖZDEN[**]

INTRODUCTION

Today, 3 billion people which is more than half of the world population live on coastal areas including waterfront lines all around the earth. The projection for the next two decades points out around 6.4 billion people who prefer or force to live in coastal areas due to various reasons (Yontar & Yılmaz, 2013). Constantly increasing pressure on coastal areas and waterfront lines have brought out environmental problems. Irreversible losses of coastal area sources due to environmental damages pertaining from land use policies and practices have oriented many countries to move for taking measures. This movement has developed the "sustainability" term for coastal areas and waterfront lands. Different approaches and policies have been developed and applied in order to limit the land use on waterfront lines, prevent from irreversible damages, protect public welfare during land use, and prevent from waterfront speculations (Uçlar, 2012). Turkey is surrounded by sea from three sides and this geographical location defines the country as a peninsula. The total length of coastal line is about 8.333 km (Tan, Seki, & Akbulut, 2014).

One third of Turkey's population lives on coastal areas and this number has a rapidly growing trend due to mainly socio-economic, environmental, and physical advantages of coastal areas. Although rapid population growth and migration have great influence and pressure on existing cities in Turkey, the growing preferences and interest on living in coastal cities have been developing an important pressure for those settlements. In that sense, planning and use of waterfront areas in the coastal cities have been growing importance as well (Çavuş, 2007). To ensure sustainability and livability of these cities has become a target for the central and local governments under the growing pressure of rapidly increasing populations and human needs in waterfront areas. Çanakkale is a small-scale city which is located on the South-western of Turkey, on the coastal line (Figure 1). The city has a populaton of 120 thousand and located mainly on south-west / north-east direction on the coast of "Çanakkale Bosphorus" or "Dardanelles".

THE HISTORY OF URBAN DEVELOPMENT IN ÇANAKKALE

The city is divided into two parts by a river which is named as "Sarıçay" (Figure 2). North of this river mouth where it meets with Dardanelles is the place on which the first settlements had been started in the history. The construction of Çimenlik Castle on

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the river mouth which was dated to 15th century was the initial core of the city on which the first settlements were located around the castle (Erginal & Erginal, 2003; Ilgar, 2011). The first residents of the region were believed as the soldiers and servants who lived in and around the castle. However, it was not observed significant growth of city until 18th century (Erginal & Erginal, 2003).

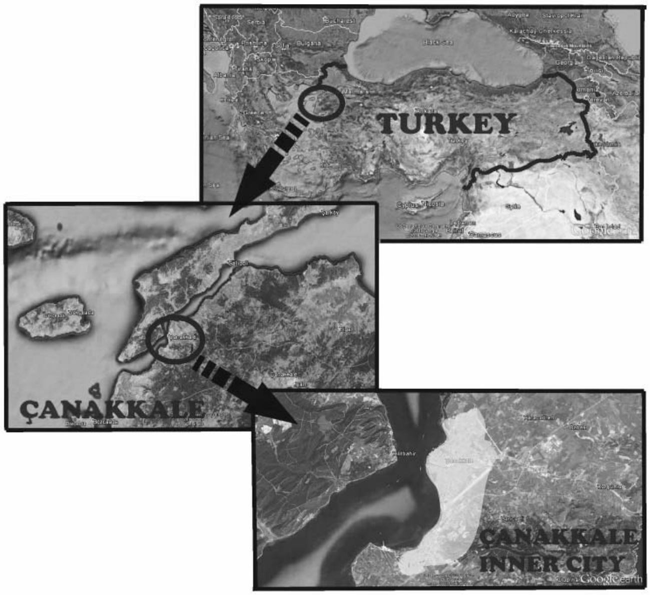

Figure 1: Location of Çanakkale city (Produced from Google Earth, 2016)

Figure 2: Sarıçay River divides the Çanakkale City as North and South (GoogleEarth, 2016; Turkish Aeronautical Association, , 2016)

Dardanelles and both sides of this topography have been the most strategical areas in the history of the region. The Çimenlik Castle which was built in 1462 is located on a very strategical point on the Dardanelles as well (Fig. 3). There are many other castles which were located in different periods on the different sides of Dardanelles. The main objective of those castels was to observe the sea in case of any enemy invasion. Therefore, those castles were used as the main structure of Dardanelles defence which was mean also the defence of Marmara Region and İstanbul city which is the biggest metropolitan area of Turkey now. The city of İstanbul was also important through out the history because it was the capital city of East Roman Empire, Byzantine Empire and lastly Ottoman Empire. In that sense, Çanakkale city has the duty to defend this major city through out its settlement history which has been began by the construction of Çimenlik Castle. Increasing trade activities and migrations from different parts of Turkey during the 18th century expanded the borders of initial city core, around the Çimenlik castle. Different ethnical and religous groups developed neighbours in this region (Fig. 4) (Erginal & Erginal, 2003; Çavuş, 2007). Greeks, Turks, and Jews could be accepted as the main groups settled into the region.

Figure 3: Views of Çimenlik Castle which is located on the corner where Sarıçay River and Dardanelles meets (Official Website of Çanakkale Governorship, 2015)

Until the 19th century, the growing trend was relatively strong. However by the 19th century, the wars affected the Ottoman Empire and the depressive events resulted in population losses and migration in the region. After the foundation of Turkish Republic in 1923, the population trends showed up-and-down appearance until 1950s (Fig. 5). The Second World War times, and socio-economic inequalities and deficiencies of the region resulted in very slow population changes. In 1940s, the first planning efforts were observed for the city (Erginal & Erginal, 2003). The government mostly gave permission of building 2-story houses with gardens (Fig. 6). In 1950s, with the fundamental changes among the political approaches, building industry gained speed and population growth had become more observable in the region. Migration from rural to urban trend had started by those years as well. The neoliberal policies would also gain importance among economic and political approaches in Turkey, particularly by the 1980s. The continuous population growth has been a common problem which has great pressure on the urban land use, and caused coastal area damage by the 1980s as well.

The urban area has been using mostly the lowland areas and plains but particularly the coastal line of the city. The city center has reached to today's borders in parallel to growing demand and practices (Fig. 7).

Figure 4: Expanding city borders during 18th century shows the neighbourhoods (Çavuş, 2007; GoogleEarth, 2016)

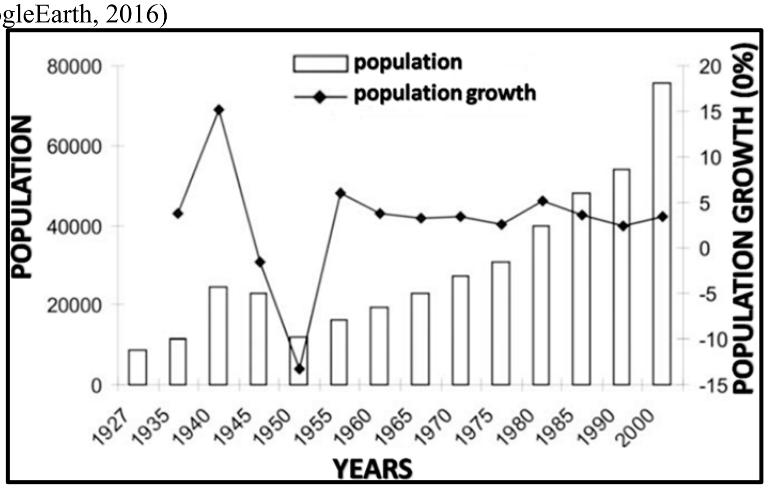

Figure 5: Population growth between 1927 and 2000 in Çanakkale (Çavuş, 2007)

The coastal areas and particularly waterfronts have been the first settled areas through the history all of which are the most prefered sites due to economic and cultural advantages. The waterfronts have become irreplaceable sites as the attraction points for people which serve various amenities and advantages such as natural resources, transportation, and defence opportunities (Uçlar, 2012). Çanakkale city has located mainly on delta and alluvial plain which is formed by Sarıçay River. The major functions of the city have accumulated on those areas. The reason of this urban growth also depends on the radial and unplanned development pertained from the initial settlement area which is located on the Sarıçay River and delta mouth (Erginal & Erginal, 2003).

Figure 6: View from 19th Century of Old Çanakkale (Resimler.tv, 2016)

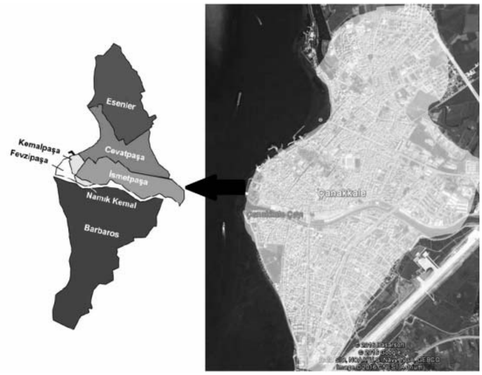

Figure 7: The map shows the existing neighbourhoods which are formed by the expansion of the city from the18th century (Çavuş, 2007; GoogleEarth, 2016)

AFFECTS OF URBAN GROWTH ON NATURAL ENVIRONMENT AND COASTAL AREAS

The rapid urban growth has been threaten the natural environment and sources particularly by the 1980s in Çanakkale which could be mainly bounded to the neoliberal politics, touristic attraction of the city, and migration from rural to urban areas. The coastal areas and waterfront also have been sharing this environmental degradation problem. The major objective of organization and arrangement of coastal area should take into account of protection of coastal area with its natural and cultural sources, and valuation of these sources rationally (Cengiz, Çavuş, & Kelkit, 2012).

It is also necessary to protect the environment against natural degradation. Çanakkale city and its environment including natural, historical and cultural sources have deteriorated due to insufficient environmental and urban protection approaches and strategies. This deterioration probably will result in unsustainable coastal area use which threatens the access opportunity of future generations.

Change of the urban area and its pressure on particularly coastal areas, as well as valuable agricultural lands could be observed clearly through satellite pictures which have been developed in 1980s and 2000s (Figure 8). These views clearly reveal that human settlement has been growing and occupying agricultural lands which have been located on delta and aluvial plains, as well as coastal areas. According to Genç (and others, 2013), whereas the human settlement was covering 11.46% of total city land in 1987, these ratios raised to 29.97% in 2000 and 36.01% in 2010. From 1987 to 2010, the agricultural areas particularly surrounding the city have been under attack by the uncontrolled human settlements (Genç, Kızıl, Arıcı, & İnalput, 2013).

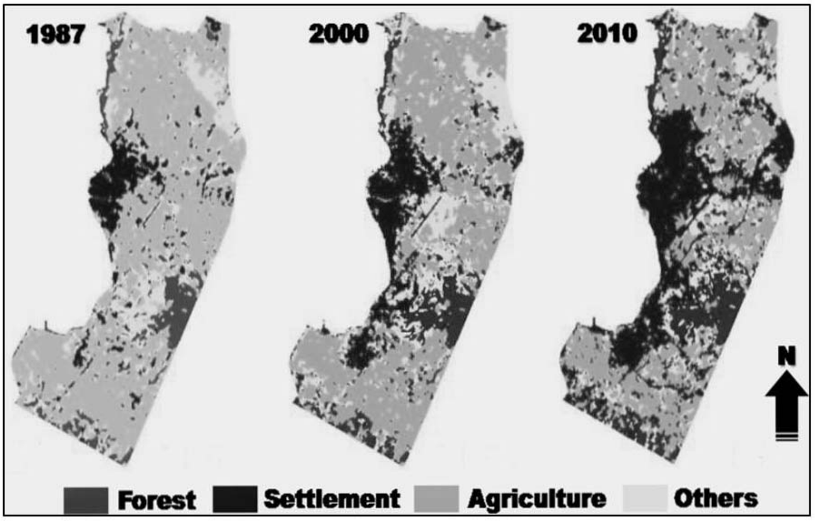

Figure 8: Satellite (LandSat) views of Çanakkale belongs to years 1987, 2000 and 2010 (Genç, Kızıl, Arıcı, & İnalput, 2013)

Uncontrolled building and unconscious tourism practices (Ilgar, 2009) have been transforming agricultural lands into concrete settlements most of which could not be reversible. Natural geographical space has been changing and existing historical, cultural, and ecological values has been destroyed. Moreover, negative effects have been increasing on natural beauties, sea, coastal areas and forests. The increasing trend of building structures on coastal areas including touristic structures such as cafeterias and restaurants also detoriate the coastal areas and waterfront.

Not only the coastal areas and waterfront but also the water as itself has been detoriated due to uncontrolled urbanization practices. The sea water is polluted by various pollutants such as petroleum, domestic wastes, chemicals, and detergents. The biological and physical pollution is also necessary for the Sarıçay River due to many pollutants produced from waterfront settlements (Ilgar, 2009).

The most charming geographical value of Çanakkale city is the existance of Dardanelles (Erginal & Erginal, 2003). In that sense, the location of multi-story apartment buildings which were located very close to waterfront except the delta mouth is bounded to this charming speciality of the geography (Fig. 9).

Liveability of waterfront area does not only depend on the physical and socio-cultural quality of the site and equipments, but it is directly related with the resilience of the community and physical environment in terms of hazards. Çanakkale region is located very close to the seismically active regions and major fault lines. The aluvial soil and agricultural lands of Çanakkale city threats the physical systems and structures which were built on those areas due to their weak and vulnerable conditions. In the waterfront areas, there are filled lands where the city approaches most to the sea. Those areas were the most vulnerable ones which have seismic risks, as well as landslide risks to the Dardanelles direction and inundation risks pertaining from the sea (Erginal & Erginal, 2003).

Figure 9: View from a part of waterfront location of the city (Canakkalegezisi.net, 2015)

Figure 10: A view from the famous Troy Horse Model which is also used in Troy Film located on the waterfront and the sunset view from the Sarıçay River (Açmaz Özden, 2016)

On the other hand, due to long return period of seismic activities, slow onset behaviour of global warming side effects, and deficient disaster culture development among the communities, people ignore the hazards and disaster risks. The attractive points, natural and cultural beauties (Figure 10), economic developments, rapidly increasing land values and other issues have been orienting people to settle on risky areas without any necessary precautions.

EVALUATION OF WATERFRONT LIVEABILITY FROM A CRITICAL VIEWPOINT

Natural water source whether it is a sea or closed water area (lake etc.) or a river is very important to develop and characterize the identity of a city. Many cities around the world which could not own a natural water source need to find solutions through artifical water areas such as artifical lakes. Çanakkale is very prosperous in terms of having natural water sources. She has two very characteristic water areas; Dardanelles and Sarıçay River both of which run through the city center. These two important waterfront areas need to be reevaluated from the point of holistic approach in order to meet the sustainability of the both areas and the city. The partial solutions without evaluation and application of sustainable city growth policy will damage the natural and cultural sources of the region.

The main waterfront areas of the city center is divided into 8 parts in order understand and evaluate the insufficient holistic view of the attractive land. The zones are numbered from 1 to 8 which indicate; 1- Military Zone, 2- Dardanelles Waterfront A, 3- Çimenlik Castle, 4- Institutional Zone, 5- Historical Defence Bastions, 6- Dardanelles Waterfront B, 7 - Sarıçay Waterfront, 8- Outdoor Market Place (Figure 11). The overall map reveals the deficient approach in terms of connecting waterfront area which is necessary for the accesibilty of the public and sustainability of the area.

The zones which public can access for the recreatinal activities and spending their spare time is evaluated from holistic and socio-spatial sustainability view point. These zones are colored with red. On the other hand, the blue colored zones are private places and institutional, as well as public areas which constitute barriers for the continuity of the waterfront line in terms of public access. Althoug the zones number 3 and 5 are the public places both of which are used as open air museums for their historical features, it is difficult to reach them by walking or bcycles through the waterfront line.

In general, the waterfront zones are mainly composed of pedestrian roads which were constructed from concrete (Figure 12). There are limited amount of greenscape environment and fittings. The sand beach on the Waterfront B area (zone number 6) has a very popular use, particularly in summer times for swimming, sunbath and other water related activities.

The Sarıçay Waterfront area (zone number 7) is about a 1.8 km long line which is used actively by public (Figure 12, 13 and 14). Not everytime both sides of the river can be used for recreational activities because some parts of the waterfront line are just planted and these green areas do not make possible of public to access and use actively. There are playground areas some of which are very neglected and insufficient for actively use of children. particularly the water is not used efficiently by the public as well. There is not a system which make possible to travel on water vehicles on the river for recreation and fun. The boats which are located on the mouth of the river are just used for fishing activities and they are all private boats which belong to people. Therefore, the public cannot benefit from them. The parking area of those boats is not proper and there is an esthetic problems related to their disorderly parking or waiting areas on the river mouth. The waterfront area probably cannot meet the technical and logistic needs of those boats as well.

The pedestrian bridges which can be accepted as the important part of waterfront continuity are not designed proparly (Figure 14). There are 3 pedestrian bridges which are very narrow and do not serve any functional and aesthetic features for people who use those structures. They are just used for passing from one side to other side. The motorcycles and bicycles also use these pedestrian bridges very often and they pose hazards such as traffic accident for both pedestrians and other motor vehicles.

Figure 11: The Zoning of Waterfront Areas in City Center (Produced from Google Earth, 2016)

Figure 12: The general views of Waterfront Areas in City Center (Açmaz Özden, 2016)

Figure 13: The views from Sarıçay Waterfront Area (Zone Number 7) in City Center (Açmaz Özden, 2016)

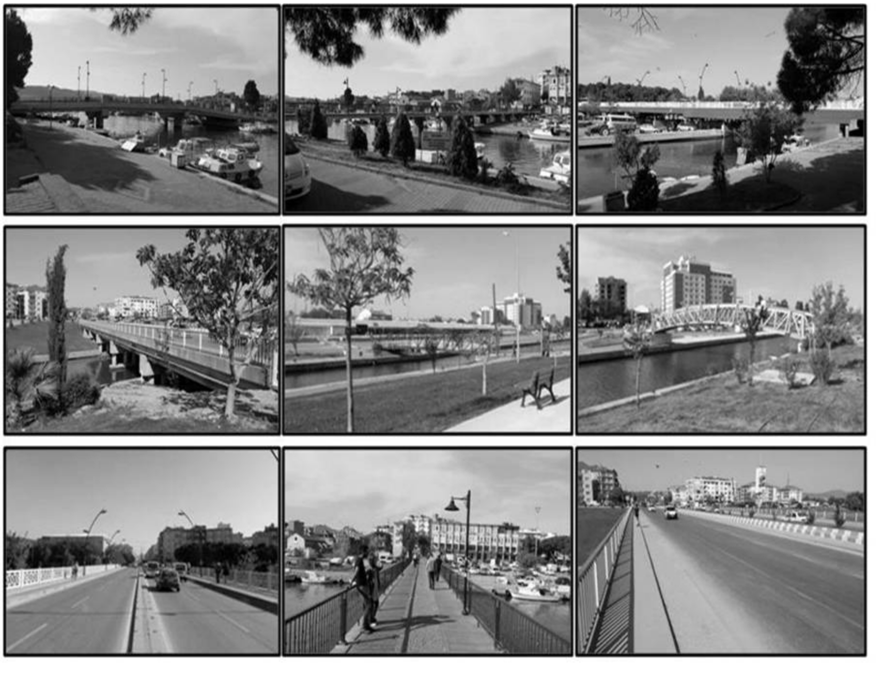

Figure 14: The views from pedestrian and motor vehicle bridges on Sarıçay River (Zone Number 7) in City Center (Açmaz Özden, 2016)

There are also three brdges for motor vehicles which are used for transportation in the city center. They are also important problems in terms of design and public use, particularly for pedestrians and bicycles. The points which all of the bridges landed to the ground are not designed orderly and the landscape is very insufficient. The bridges located on such a wide and long river bed are needed to be designed more aesthetically and funtionally. They have the potentials to contribute to the city image and waterfront identity. However, the existing ones cannot use this potential.

There are parking areas which cover a very great area on both sides of the Sarıçay waterfront (Fig. 15). The concrete parking areas damage both the natural and socio-spatial quality and sources of the region. The need for parking area is inevitable but the area preferences should be re-evaluated for the sake of ensuring visual and accessing sustainability of the waterfront. Public could not benefit from the waterfront because of the very wide parking areas.

There are not any orienting and information signs or signboards in the region. It is a necessary to locate these kinds of signs which give information about the region, the waterfront development and history of the area. This is a very useful tool for both the locals, particularly children, and tourists who visit the area. These kinds of tools also contribute to develop environmental awareness and sensitiveness about the environment and nature in order to protect and ensure the sustainability of the region.

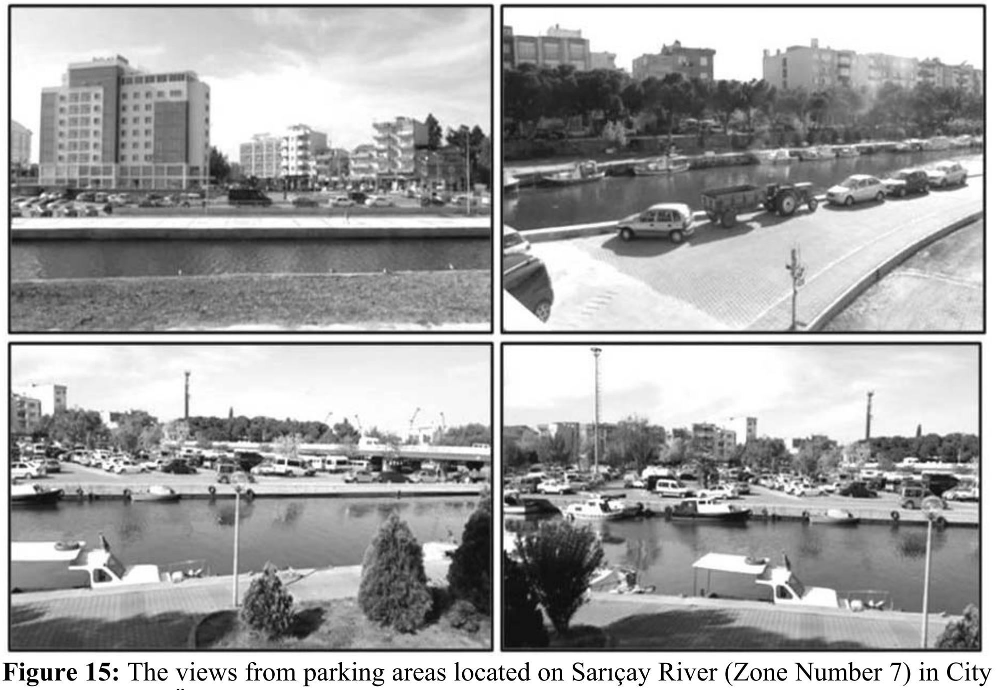

Figure 15: The views from parking areas located on Sarıçay River (Zone Number 7) in City Center (Açmaz Özden, 2016)

There is a very huge covered market area on the Sarıçay River waterfront which is numbered as Zone 8 (Figure 16). This area is used for public densely in two weekdays (sunday and friday). An open market is set up in these days in which various things including food and clothes. On the other days of the week, this area is not used and leave empty. The connection to the waterfront is very weak during the market days.

There should be direct and functional, as well as aesthetic connection to the river side where people can benefit from the river and landscape. In the week days which there is not a market, the area can be used as a public area in which concerts, dance and theather organizations, meetings, different courses can be organized, particularly in summer times both in day time and evenings. The existing structure covers a very wide area and is used for a limited function in a very limited time. The waterfront areas located on the Dardanelles and which are numbered as Zone 2 and 6 (Fig. 17 and 18) have a similar size but quite different roles within the city life. The Zone number 2 which is also known as "Old Waterfront Line" gas a very wide pedestrian road on which troy horse sculpture is located (Fig. 17).

Figure 16: The view from covered market area located on Sarıçay River (Zone Number 8) in City Center (Açmaz Özden, 2016)

Figure 17: The view from waterfront (Zone Number 2) which is known as "Old Waterfront Line" in City Center (Zete, 2013; Canakkalegezisi.net, 2015; Uçanta, 2015; UEMP, 2016)

This area also hosts the seaport which is used densely in daytimes. The ferries carry people and vehicles between Çanakkale city center and Gallipoli region which is located on the opposite coast of Dardanelles. Therefore this area is used not only for recreational activities but also transportation. On the other hand the waterfront zone numbered as 6 is mainly used for recreational activities and swimming in summer times whereas swimming is not possible for the zone 2 area (Fig. 18). Zone 2 area is very older than the other area, and therefore there are more old but multi-story apartments are located on this site. The zone 6 area is composed of newer buildings most of which are also composed of multi-story apartment blocks.

Figure 18: The views from waterfront (Zone Number 6) in City Center (Açmaz Özden, 2016)

The activities on these areas are accepted as sufficient. But the major problem is the waterfront line is not continuos and the line has strong physical barriers which make public to access from one side to other side difficult. The apartment buildings also have strong pressure on the formation of the waterfront. The waterfront line is narrowed due to apartment blocks which approach so close to the sea. Therefore it has been needed to fill the shore which damages the natural environment, and generates and intensify the affects of hazards such as earthquake, liquefaction, inundation etc.

The insufficient green areas, softscape features, and deficient landscape design problems can be mentioned other general and common problematic issues as well. The sea is also under the threat of pollution pertaining from very heavy sea traffic and rapidly increasing population with building pressure on waterfront. Therefore, it is needed to think from a holistic view which do not take into account of just waterfront use but also sea quality and protection from pollutants. The pollution of sea directly effect the liveability of the waterfront areas. In that sense, the waterfront-sea relation should be evaluated from an integrated viewpoint.

DISCUSSION AND CONCLUSION

The open green areas in urban development have important role for sustaining stress-free environment and zones without discriminating age, gender, and socio-economic conditions of people who live in the city. Therefore, more green area means less stress and high living quality (Gültürk & Şişman, 2015).

The major targets of urban design projects are to gain identity to the city, ensure multi-functionality, organize the pedestrian-vehicle traffic, and develop communual areas (Cengiz, Çavuş, & Kelkit, 2012). On the other hand, all these targets have to meet livability and sustainability of the urban land. Holistic policies and user participation is strongly needed to achieve these targets.

It is oftenly mentioned on the increasing negative effects of human activities on nature which also means forcing to exceed of carrying capacity of nature in negative way. In this regard, new and developing terms such as sustainable cities, sustainable urban development, sustainable urban settlements, clean cities, innovative cities, healthy cities, learning cities, eco cities, and livable cities particularly in developing economies such as Turkey have been emerging and discussed (Palabıyık, Yavaş, & Önder, 2006). These terms also have been opned the argument of public and stakeholder participation to the urban development and building practices. Particularly for coastal cities, non governmental organizations and other stake holders are needed to participate to the coastal area management and waterfront development as well as protection. However, this participation does not mean to participate as the operational body, but more it means a position which have the responsibility and role of consultation and advisory support to the operational bodies such as local governments (Yontar & Yılmaz, 2013).

The projects and/or recreational activities that are improper with the natural and built environmental conditions of waterfront areas damage the natural structure and affects the healthy socio-spatial development. The contradiction between legal and administrative structures including laws and regulations, and governmental institutions affect the holistic use and protection of waterfront line. The major contradiction is between "conservation - use balance" and "the regulations for the encouragement of touristic activities" which is seen as a very high economical input for the region. The economic development and natural environemnatl protection balance should be taken into account by both central and local administrations. Public should be awared of this balance as well.

Recreational activities should be sustainable and include different features which also take into consideration of disable population living in the city or visitors. Supporting and developing multi-functional communual areas and playground could be a good idea in terms of access to and benefitting from waterfront and green areas. Diversifying the activities while protecting the natural structure is a necessity for the region. For instance, playground areas for children do not mean just fun and spend of spare time, but it means also training, education, personality development, socializing etc. all of which support healthy development of a child. Particularly Sarıçay waterfront area has potential to achieve all the multi functional services for public.

The pedestrian and cycling alternatives should be developed, enhanced and applied to the waterfront areas. More green areas and proper landscape design are needed in the region. Continuity of the waterfront should be sustained. The growth direction of the city still indicates the use of more waterfront areas on the north and south directions. Holistic projections and evaluations are needed. The future projects developed for waterfront areas have to take into account of these projections and insufficient, as well as weak sides of exiting areas.

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Chapter 23

Slow Cities as a Tool for the Sustainability of a Healthy Physical Environment

Çiğdem KILIÇASLAN*, Emine MALKOÇ TRUE**

THE PHILOSOPHY OF THE SLOW CITY

Cities are social organizations that contain cultural, social and administrative structures for the people allowed to live in community and are organisms with containing change / transformations. However, today's cities are evolving to "non-place" based on the speed and money economy that is dominated by the process of globalization and capitalist system. Cities, which have lost their natural environments with urban problems, lost their cultural and social values in the globalization process (Adıgüzel Özbek & Erikçi, 2014).

The influence of globalization has showed itself on cities which have turned into places that are designed to move and work faster and have become insufficient living spaces where people work fast, live fast and consume more than they produce. Cittaslow movement in urban areas rose, as the consumer wise life does not bring happiness and peace so that people are looking for a different way of life (Cittaslow Türkiye, 2015).

The globalization and changes in modern society represent both opportunity and threat for national cultures, heritage and identity. Cities and regions are losing their traditional heritage and keeping up with global trends and fashions rather than reviving local traditions, history and values (Valcic & Domsic, 2012). The Slow City movement is against the loss of traditional heritage and identity caused by globalization and popular culture.

The Slow City movement seeks to extend the Slow Food movement's philosophy to all aspects of urban living, providing an agenda of local distinctiveness and urban development (Heitmann, Robinson & Povey, 2011).

The Slow Food movement was started by Carlo Petrini and a group of activists in the 1980s (Slowfood, 2016). The movement aims to preserve cultural cuisine and in so doing to preserve the food plants and seeds, domestic animals and farming within an ecoregion. The slow food movement has become a social and political movement capable of resisting the dehumanising effects of large-scale, commercial food production and the fast-food industry (Slowmovement, 2016a).

In addition the Slow Food Movement focuses on connection with (Slowmovement, 2016b):

- Traditional seeds;

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- Food production;
- Food sourcing;
- Food buying;
- Food preparation;
- Traditional recipes and ingredients;
- Food consumption; and
- Waste food disposal.

In over two decades of history, the movement has evolved to embrace a comprehensive approach to food that recognizes the strong connections between plate, planet, people, politics and culture. Today Slow Food represents a global movement involving thousands of projects and millions of people in over 160 countries (Slow food, 2016).

A further development of Slow Food is the Slow City movement, which builds on the ideas of Slow Food but extends the philosophy to cities and destinations. The Slow Food and Slow City movement encourage a change of mindset and philosophy and a re-evaluation of changes that modern society has brought (Heitmann, *et al.,* 2011).

Cittaslow, composed of the words "Citta" (City) in Italian and "Slow" in English, is used in the meaning of slow city (AFD, 2015) and defined as a local development model for small and livable cities (Vize Municipality, 2015).

Slow City philosophy is based on two concepts (Cittaslow International, 2016a);

- Good Living means having the opportunity of enjoying solutions and services that allow citizens to live in their town in an easy and pleasant way,
- Living Slow means looking for the best of the knowledge of the past and enjoying it thanks to the best possibilities of the present and of the future.

The Slow Cities movement promotes the use of technology oriented to improving the quality of the environment and of the urban fabric, and in addition the safe-guarding of the production of unique foods and wine that contribute to the character of the region. In addition, Slow Cities seek to promote dialog and communication between local producers and consumers. With the overarching ideas of environmental conservation, the promotion of sustainable development, and the improvement of the urban life, Slow Cities provide incentives to food production using natural and environmentally – friendly techniques. The designation "Slow City" will become the mark of quality for smaller communities. Slow Cities are not state capitals or the seat of regional governments, but are strong communities that have made the choice to improve the quality of life for their inhabitants (Cittaslow International, 2016).

Citta Slow has developed a (Slow movement, 2016c):

- Manifesto – setting out the underlying principles
- Charter of Association – cities wanting to be granted the status of Slow Cities must sign this charter
- A list of member cities
- Plans for an annual gathering.

Cittaslow not only ascribes to the emphasis on local produce and food quality manifested in the 'eco-gastronomic' and environmentalist agenda of Slow Food, but also to a set of criteria for local urban governance aimed at improving local quality of life, maintaining local uniqueness and supporting sustainable urban economies (Pink, 2009). Cittaslow movement set its goals on purpose that the cities where people can communicate with each other and which do not have infrastructure problems, use renewable energy sources, benefit from the technology, protect their traditions, nature and handicrafts, are sustainable and self - sustained, can be a realistic alternative for the cities of today's world (Cittaslow Türkiye, 2015).

INTERNATIONAL CONTEXT OF THE SLOW CITY

A slow city agrees to work towards a set of goals that aim to improve the quality of life of its citizens and its visitors, and to share good ideas, experiences and knowledge across the national and international Cittaslow networks. One of these goals is to create borders against the spread of the 'fast life', the philosophy and materiality of which is embodied in the 'fast food' restaurant chains, which are fast replacing traditional restaurants in Europe and in many other parts of the world (Miele, 2008).

In 1999, inspired by the Slow Food movement, four small Italian towns announced they would establish "Cittaslow International" to devote themselves to advocating slow living, protecting local features against the background of globalization, and improving the quality of life of local residents. So far, many cities in the world have joined "Cittaslow International" and become "international slow cities" (China Daily, 2016).

According to (Cittaslow International Charter, 2014), the Association is not a profit entity and its objectives are to promote and spread the culture of good living through research, testing and application of solutions for the city organization. The Association founded in Orvieto on 15th October 1999, values the creation of resilient microeconomics, the exchange of good practices across the Network, promotes citizenship actions in local communities, across cities and its territories, in cultural, environmental, social and economic aspect, today and for future generations. The association disseminates sustainable development principles in cities and offers suggestions on how to limit the negative effects of globalization in terms of the pressure for uniformity and standardization (Grzelak – Kostulska et al., 2011).

Cittaslow, an organized network of small cities, is attempting to focus urban and regional plans around the primary asset of place-based identity, by choosing to preserve the threats of each urban area's own unique characteristics (Radstrom, 2011). To be eligible for membership, candidate cities must have no more than 50.000 inhabitants and must pledge to introduce a range of measures from the promotion of organic agriculture to the creation of centres where visitors can sample local traditional food. They must also take steps to protect the sources and purity of the raw ingredients and to fend off the advance of fast food and cultural standardization. Membership of the Cittaslow movement is carefully controlled, and cities are admitted to membership only after trained local 'operatives' have prepared an initial report on the city's commitment to Slow City principles (Knox, 2005).

The Slow City manifesto contains 72 requirements, grouped into seven categories upon which cities are assessed (Cittaslow International Charter, 2014);

- Energy and Environmental Policy,
- Infrastructural Policies,
- Quality for Urban Life Policies,
- Agricultural, Touristic and Artisan Policies,
- Policies for Hospitality,
- Awareness and Training,
- Social Cohesion and
- Partnership

Table 1. The Slow City manifesto requirements (Cittaslow International Charter, 2014)

REQUIREMENTS	EXAMPLES
Energy and Environmental Policy	Air quality conservation
	Reduction of public light pollution
	Purification of sewage disposal
Infrastructural Policies	Planning of ecomobility as an alternative to private cars
	Removal of architectural barriers
	Percentage of residents that commutes daily to work in another town
Quality of Urban Life Policies	Creation of spaces for the commercialization of local products
	Cable network city
	Promotion of public sustainable urban planning
Agricultural, Touristic and Artisan Policies	Increasing the value of working techniques and traditional crafts
	Conservation and increasing the value of local cultural events
	Additional hotel capacity
Policies for Hospitality, Awareness and Training	Good welcome
	Increasing awareness of operators and traders
	Insertion/use of cittaslow logo on headed paper and website
Social Cohesion	Integration of disable people
	Youth condition
	Multicultural integration
Partnership	Support for Cittaslow campaigns and activity
	Collaboration with other organizations promoting natural and traditional food
	Support for twinning projects and cooperation for the development of developing countries covering also the spread philosophies of cittaslow

These areas go beyond a basic slow philosophy to practical ways of improving the quality of life for residents, through environmental and place sustaining means (Radstrom, 2011).

Cittaslow International Network consists of 213 cities present in 30 Countries in the World (Cittaslow International, 2016b). To qualify to be called a Slow City and to use the snail logo, a city must be vetted and regularly checked by inspectors to make sure it is living up to the Slow City standard of conduct (Slow movement, 2016c).

The Cittaslow logo, consisting of an orange coloured snail turned to the left and bearing houses and steeples of a city, is a registered trademark and heritage of the association. It cannot be modified in the graphic and its use is governed by a special regulation approved by the International Coordinating Committee, which is an integral part of this General Regulations (Cittaslow International Charter, 2014).

Once a town has been certified, it is entitled to use the movement's logo and the title of Citta Slow, and to participate in the initiatives undertaken by the movement. Moreover, it will be able to grant the use of the Citta Slow logo to all initiatives and activities, public and private, which contribute to the attainment of the movement's goals. The movement is governed by an elected assembly of 10 city mayors who are responsible for updating the criteria, which are periodically discussed and amended, both in terms of their technical and scientific content. The assembly is in charge of identifying the initiatives that are of interest to the whole network, including issues relating to the budget to finance these initiatives and their co-ordination, the standards and the goals for improvement related to the mission of Citta Slow and to specific policies. Meetings are held in a different city every year and provide an occasion for a general, technical and scientific debate on the problems of the quality of life in participating cities and for drawing up an annual report. A scientific committee, that includes representatives of Italian academia in the fields of urban design, architecture, economics, journalism and consumer studies, has been set up to give advice to the assembly (Miele, 2008).

Table 2. Certified City Numbers by Country (Cittaslow International, 2016b).

Country	Certified City Number	Country	Certified City Number
Australia	3	Japan	1
Austria	3	Netherlands	8
Belgium	6	New Zealand	1
Canada	2	Norway	4
China	4	Poland	23
Colombia	1	Portugal	6
Denmark	2	South Africa	1
Finland	1	South Korea	11
France	8	Spain	5
Germany	14	Sweden	1
Great Britain	5	Switzerland	1
Hungary	1	Taiwan	4
Iceland	1	Turkey	11
Ireland	1	Turkish Rep. of North. Cyprus	2
Italy	80	United States of America	2

DOMESTIC CONTEXT OF THE SLOW CITY

Slow city movement was born in 1999 in "Chianty", a town of Italy. Afterwards, many cities from many countries, which do not want to become one of the homogenized areas created by globalization and strive to preserve their local identities and characteristics, joined the "slow city" network (Özgen, 2012). Cittaslow concept has been followed by an increasing interest in Turkey (Bekar, Yozukmaz, Sürücü & Gövce, 2015). Among the 213 Slow Cities located in 30 countries, Turkey lies joint fourth in terms of the number of Slow Cities with eleven designated as Cittaslow. Italy has 80, Poland has 23, Germany has 14, and South Korea has also 11. Slow cities in Turkey in chronological order are; Seferihisar (İzmir), Gökçeada (Çanakkale), Akyaka (Muğla), Taraklı (Sakarya), Yenipazar (Aydın), Yalvaç (Isparta), Vize (Kırklareli), Perşembe

(Ordu), Halfeti (Şanlıurfa), Şavşat (Artvin) and Uzundere (Erzurum) (Figure 1 and 2).

Seferihisar, İzmir: Seferihisar is located in the southwest of Izmir city in the Aegean region of Turkey and is surrounded by the Aegean Sea in the west and south. The distance of Seferihisar to the city center is 45 km (Şahinkaya, 2010). Population is 36.335 (Turkish Statistical Institute, 2015) Agricultural activities are the most important income source while tourism has become one of the leading sectors. With its carefully preserved urban pattern, natural structure, quiet and peaceful life it was accepted to the Cittaslow association in 2009 (Şahinkaya, 2010) and became the first slow city of Turkey. 3000 years of history (presence of Teos, Lebedos Ancient Cities and the Karaköse ruins), its long coastline, traditional life and production style were effective in its acceptance as a slow city.

Gökçeada, Çanakkale: Gökçeada is located at the entrance of Saros Bay in the northern Aegean Sea, also the westernmost point of Turkey (Cittaslow Gökçeada, 2016). Its population is 7.074. Gökçeada is the largest island in Turkey and has 91 km. coast line (Wikipedia, 2016a). Agriculture and tourism are the main sectors in Gökçeada. Gökçeada was dominated by many civilizations throughout history. The history of the island dates back to 5000 years before (Cittaslow Gökçeada, 2016). Gökçeada was accepted to the Cittaslow association in 2011. Lifestyle of the local people are conforming to the criteria of the slow city in terms of production and transportation (Erdoğan, 2016). Its specific geographical and environmental conditions and protected, untouched natural resources, traditional recipes and products were effective in its acceptance as a slow city.

Akyaka, Muğla: Akyaka is a coastal town of Muğla Province in southwestern Turkey. The town is situated at the far end of the Gulf of Gökova, at the start of the Gökova plain, and is a rising center for international tourism (Wikipedia, 2016b). Its population is 2.691 in 2015 (Turkish Statistical Institute, 2015). Akyaka was accepted to the Cittaslow association in 2011. Its unique architectural structure, natural resources and beauties such as Azmak stream, quiet and peaceful lifestyle were effective in its acceptance as a slow city.

Taraklı, Sakarya: Taraklı is a historic district in northwestern Turkey. It is surrounded by forests and located approximately mid-way between Istanbul and Ankara in the Sakarya Province of the Marmara region. Its population is 6.991 in 2015 (Turkish Statistical Institute, 2015). Owing to its cobblestone streets and architecture dating back to the Ottoman Empire, and the local bazaar, Taraklı was accepted to the membership of the Cittaslow movement in 2011. The town has undergone extensive renovations and has gained attention as a tourist destination (Wikipedia, 2016c).

Yenipazar, Aydın: Yenipazar is a town of Aydın Province in the Aegean region of Turkey. Yenipazar itself is a quiet rural town of 6.423 people (Wikipedia, 2016d). Agriculture is the main sector. Yenipazar was accepted to the Cittaslow association in 2011. Its traditional tastes and products, traditional life style, were effective in its acceptance as a slow city.

Yalvaç, Isparta: Yalvaç is a town of Isparta Province in the Mediterranean region of Turkey (Wikipedia, 2016e). Its population is 47.769 in 2015 (Turkish Statistical Institute, 2015). Yalvaç, rich in history, was founded close to the Antiokheia ancient city which was an ancient capital city and one of the most important centers of its day. Yalvaç striving to bring the historical and cultural values to the present, was accepted to the membership of the Cittaslow movement in 2012 (Sakinşehir Seferihisar, 2016).

Vize, Kırklareli: Vize is a town of Kırklareli Province in Thrace part of the Marmara Region of Turkey. Its population is 27.422 in 2015 (Turkish Statistical Institute, 2015). Town's history bases on the year 4000 BC. According to mythological sources first name of the town was Byzia (water source nymph). It was accepted to the membership of the Cittaslow movement in 2012. Vize is famous with its deep historical, cultural and natural heritage. Linden trees and linden flower honey is the famous product of Vize. Vize has its own slow food culture from the mixture of different civilizations (Cittaslow International, 2016c). Natural and cultural features, traditional lifestyle and tastes were effective in its acceptance as a slow city.

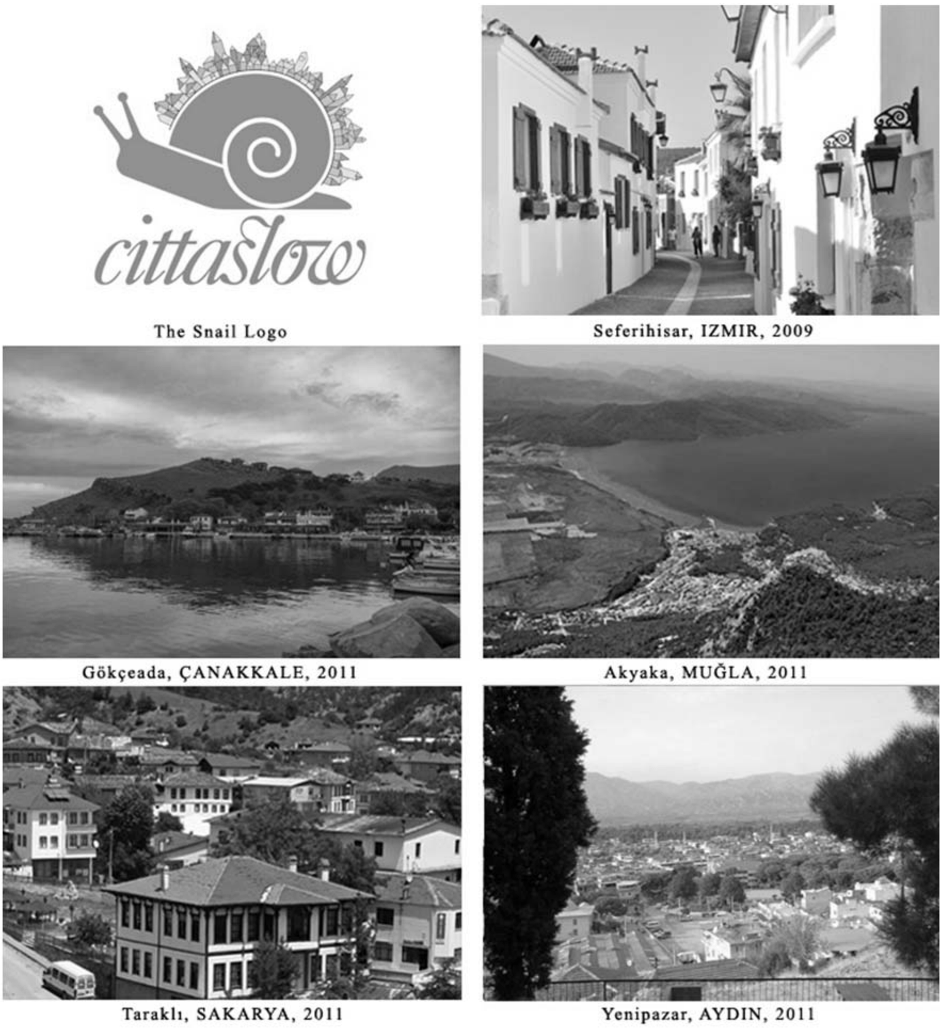

Figure 1. Slow cities in Turkey

Perşembe, Ordu: Perşembe is a town of Ordu Province on the Vona Peninsula on the Black Sea coast of Turkey. Its population is 31.094 in 2015. Its old name was Vona and its history dates back to 3000 years. It's the place where the Argonaut Legend had passed. In addition, there are fishponds dating back to three thousand years. It was accepted to the membership of the Cittaslow movement in 2012. Its untouched natural resources such as Kurşunçal Forests and Kurşunçal waterfall, Bogazcik cave, and also the hospitality of the local people, traditional food culture were effective in its acceptance as a slow city (Perşembe Municipality, 2016).

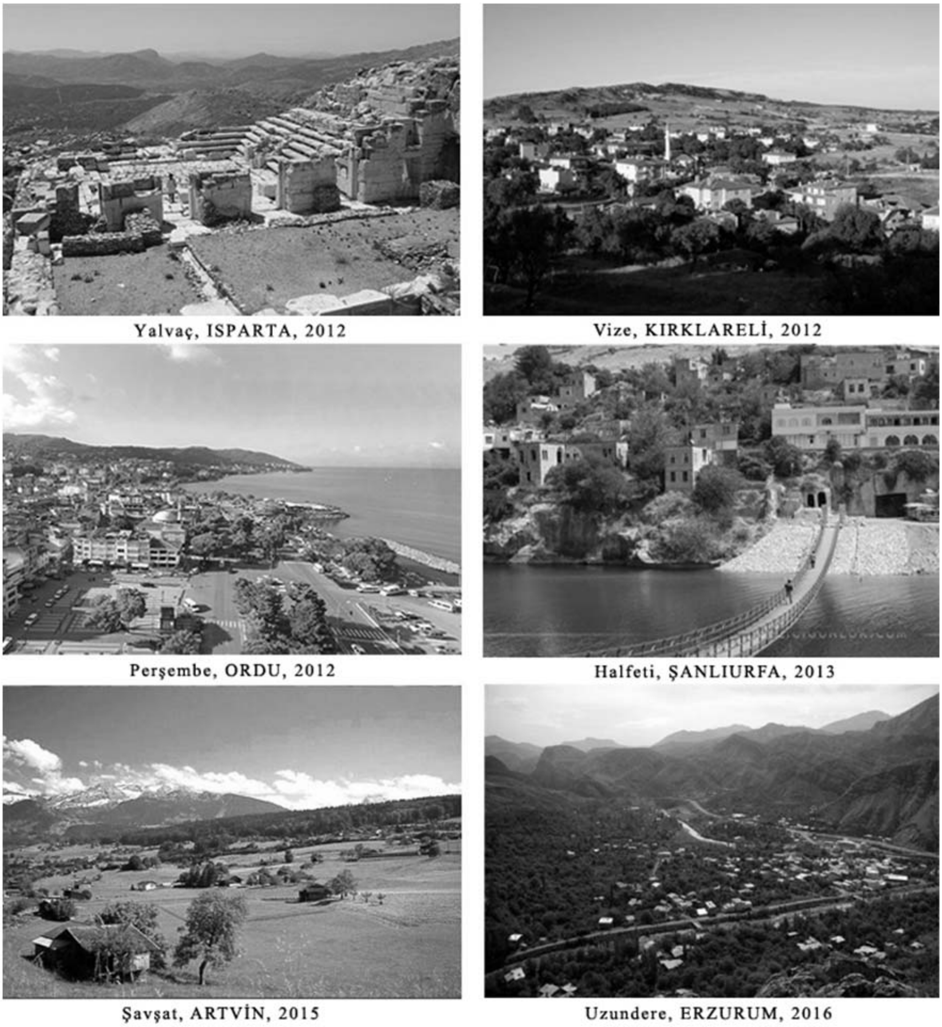

Figure 2. Slow cities in Turkey

Halfeti, Şanlıurfa: Halfeti is a small farming district on the east bank of the river Euphrates in Şanlıurfa Province in Turkey, 120 km from the city of Şanlıurfa. Its population is 37.930 in 2015 (Turkish Statistical Institute, 2015). The Assyrian King (855 BC) established a settlement here named Shitamrat. The town was subsequently settled by a number of civilisations and known as Urima. As part of the South eastern Anatolia Project, GAP, several dams were constructed in the area and surrounding regions as part of a larger agricultural and economic initiative. Halfeti was among those settlements, ancient and contemporary, that would remain under the rising water levels. Until the area was flooded in 1999, the people lived from fishing in the Euphrates

(Fırat) and farming on the riverbank. New Halfeti was built 15 km away from the old one. The old town of Halfeti is only partially submerged and is attracting visitors. The countryside is also attractive, although the green valley of the past is now underwater (Wikipedia, 2016f). Halfeti was accepted to the Cittaslow association in 2013. Its historical background, old stone houses, being a sunken city and natural beauties were effective in its acceptance as a slow city (Anadolu Ajansı, 2016).

Şavşat, Artvin: Şavşat is a town of Artvin Province in the Black Sea region on the border with Georgia at the far eastern end of Turkey. It is surrounded by high mountains, including the 3,537 meter Karçkal (Kaçkar) Mountains to the west, and watered by many streams and pools (Wikipedia, 2016g). Its population is 17.524 in 2015 (Turkish Statistical Institute, 2015). Its history dates back to Urartu and Cimmerians from 900 to 650 BC (Şavşat Municipality, 2016). Şavşat was accepted to the Cittaslow association in 2015. Its natural beauties, cultural values, traditional lifestyle and traditional tastes were effective in its acceptance as a slow city.

Uzundere, Erzurum: Uzundere is a small town of Erzurum in Turkey, 84 km away from the city of Erzurum. Its population is 8.058 in 2015 (Turkish Statistical Institute, 2015). Agriculture and livestock are the main income source. Tortum Waterfall and lake are within the boundaries of the town. Uzundere was accepted to the Cittaslow association in 2016. Its natural and cultural features, traditional rural lifestyle, traditional tastes, historical buildings and suitability to extreme sports were effective in its acceptance as a slow city (Cittaslow Türkiye, 2016).

Cittaslow is adopted and the number of members is increasing day by day in terms of social and cultural identity and local management models. Thus, small towns are gaining importance and value besides metropolitans (Adıgüzel, 2013). There are many cities in Turkey having the potential to become slow city. It is important that cities eligible for the slow city project in Turkey and in World should be encouraged to be a slow city, and their enrolment in this network through national policies counts a lot so as to provide them with sustainable life styles and a more improved life quality (Özgen, 2012).

CONTRIBUTIONS TO LOCAL DEVELOPMENT AND SUSTAINABILITY

The most important concept in current environmental thinking is sustainability. According to Paul Ekins and Les Newby sustainability is the capacity for continuance more or less indefinitely into the future (Bonevac, 2010). In fact, besides the natural heritage, what we bequeath to future generations also includes cultural heritage: art and cultural landscapes as well as infrastructure, and technology (Kuhlman & Farrington, 2010).

It has only been within the last 100 years that cities have attracted more than a few percentage of the world's population. With the prediction by the United Nations that 60% of the world's population will live in cities by the year 2030, it is apparent that the immediate global future is one of urbanisation. Although the city has been in existence for more than 10,000 years, it has only been a dominant feature of human existence for the past couple of hundred years. Cities are far more than physical containers storing people, goods and knowledge. Cities are in themselves an expression of society, requiring software in the form of management, governance, commerce, culture, education and community to facilitate a milieu for human existence and interaction. Central to the issue of sustainability must therefore be the increasing domination of the city (Egger, 2006). In this context, sustainable city concept has gaining importance. According to Keskin (2012), sustainable city approach involves environmental, social and economic factors interactively both affect urban development and are affected by it, moreover, it requires deciding on the future of a place with participatory processes. Various sustainable city approaches, which the quality of human life is centralised, are put forth in order to make the world more livable. One of them is Cittaslow movement (Baldemir, Kaya & Şahin, 2013). The fundamental philosophy of the movement is to provide the sustainability of the city with its own values. Its most important aim is to increase the life quality of the local people in the city (Erdoğan, 2016).

Slow City sustainable development concept can essentially be described in terms of four basic dimensions:

- Environmental sustainability,
- Economic sustainability,
- Social sustainability

It is worth mentioning here that 'slow cities' has been an acknowledged concept, a model of local development that aims to protect cities from the homogenization brought about by globalization, as well as to carry local features and historical heritage into the future (Deccan Herald, 2016).

The Cittaslow association disseminates sustainable development principles in cities and offers suggestions on how to limit the negative effects of globalization in terms of the pressure for uniformity and standardization (Table 3) (Knox 2005; Mayer and Knox 2006; Kostulska, Hołowiecka and Kwiatkowski, 2011).

Table 3. Negative Effects of Globalization (based on Cittaslow Int. Charter, 2014)

REQUIREMENTS	NEGATIVE EFFECTS OF GLOBALIZATION
Energy and Environmental Policy	Air pollution, water pollution, less drinking water, increase in urban waste, more sewage, increase in energy use, use of non - renewable energy sources, visual pollution, light pollution, increase in electrical consumption, decrease in environmental biodiversity.
Infrastructural Policies	Less ecomobility due to more private car use, architectural barriers, lack of initiatives for family life and pregnant women, less accessibility to medical services, less cycle paths.
Quality of Urban Life Policies	Decreasing the value of civic centres, less green areas, worse working conditions, increase in pollutants such as noise and electrical systems, less productive green areas, more cement in green areas.
Agricultural, Touristic and Artisan Policies	Less agro – ecology, decreasing the value of traditional crafts, less use of local products especially organic, more use of GMO (Genetically Modified Organisms) in agriculture
Policies for Hospitality, Awareness and Training	-
Social Cohesion	More poverty, less public housing, lack of youth facilities, less sense of community
Partnership	-

As it is mentioned above, negative effects of globalization can be solved under seven categories according to Cittaslow criteria (Fig. 3):

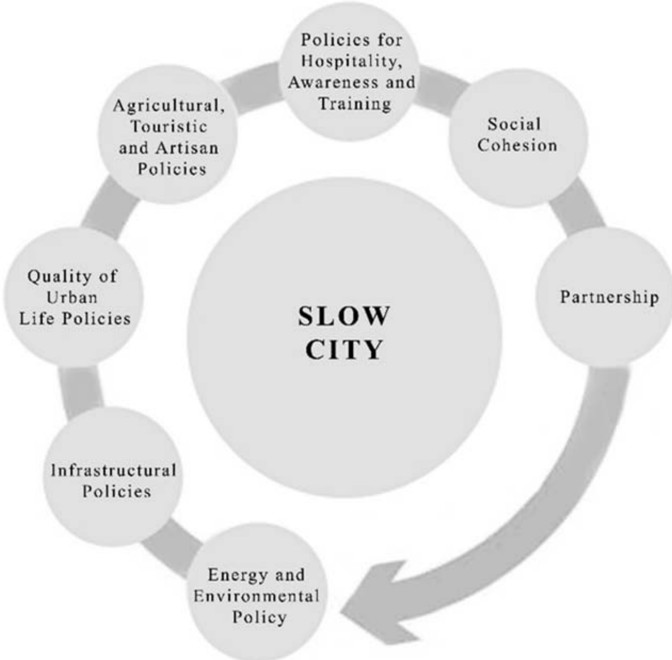

Figure 3. Seven categories of the Slow City criteria

Cittaslow represents an alternative way for sustainable development when compared to the urbanized cities of our day (Table 4).

Table 4. Comparison of the urbanized city and slow city according to their characteristics (Developed from Imbroscio, 2003)

	URBANIZED CITY	SLOW CITY
CHARACTERISTICS	Homogenized	Idiosyncratic
	Inequitable	Equitable
	Industrial	Craft
	Standardized	Customized
	Corporate	Grassroots
	Unsustainable	Sustainable
	Copied	Authentic
	Low quality	High quality
	Replicable	Asset spesific
	Intensive to local history and culture	Sensitive to local history, culture
	Fast	Slow

As it can be seen, the Cittaslow city is in harmony with itself and its surrounding area, integrated with its traditional values, respectful to the nature and history, has strong infrastructure, and collaboration at high level, has a unique structure in addition to its modernity (Ekinci, 2014).

Once the criteria of slow city have been examined, one can observe that it has almost similar objectives with those subjects as the urban quality of life and sustainability (Coşar, 2014).

Achieving the required criteria of being a slow city can be evaluated as the quality guarantee and increase the life quality of the local people and also the visitors (Sırım, 2012).

Slow cities while protecting the heritage of the past, also use the modern technology. Using the technology has to be handled in means of increasing the life quality of people and for the sustainability of the city. The most important feature of the slow city is its contribution to local people as they can participate to the process.

According to Sezgin and Unuvar (2011), creating a city identity and to make the residents happy from the place they live, eventually results with the feeling of satisfaction and pride of belonging to that city (Sırım, 2012) and results with protecting the values of the city.

Protecting the culture and local history of the city, uniqueness of the place and also hospitality of the local people make the city an attraction point for the visitors and contribute to the sustainable development of the city.

Cittaslow movement is critical of the globalization of trade that has led to a growing global standardization of lifestyles and ways of thinking. However, based on this observation and beyond criticism and the rejection of globalized, polluting cities that value speed above all else, the movement also proposes concrete solutions to create a new kind of city and a new way of living (Mathivet, 2009).

In order to achieve this, the Cittaslow movement's work is based at local levels. To confront globalization, slow city activists focus their efforts on local development, whether at the political level by working with municipalities or at the economic level by giving preference to local products (Mathivet, 2009). In this context, it can be said that being a slow city has economic benefits for the local people so that, it can be considered as a local development model. Especially, preference of local and organic products encourages the local producers and so results with an economic growth. The local and organic products and local production methods also contribute to the sustainability of the city while they are environmental friendly (Sırım, 2012).

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Chapter 24

Land Art as a Contemporary Remark on Forming the Landscape

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INTRODUCTION

The mutual relationship between human and nature, people's forming nature and nature's forming the life of people dates to archaic ages. At that ages, people's forming nature was realized through their religious beliefs and motives and this forming has had different dimensions as the time passed. This change has occured as paralell to the thought and life styles, cultural, social and political structures. Nowadays primitive man's forming nature became an ispiration for many contemporary artists (Odabaş Tuncer, 1998).

Art has always focused on thoughts and problems of communities, even before urbanization and with its contemporary situation. The context of the modern art is parrallel to philosophy and discourses of those days (Erzen, 1977). The efforts of people to create environments that express their beliefs, ideals and ideas are possible only through a conscious cooperation with nature (Ögel, 1977).

Besides the monuments with one body, creating an order with the geometrical lines which are carved on the soil, or carving huge animal figures are met in Inca and Maya ages. In 1900 B.C., English Wiltshire Stonehdge Circle which was created with massive stone buttress and column headings. It is possible to realize these kind of works, by observing them from the sky.

One more example from Medieval Age in Anatolia, Ahlat Seljukian stone headstones in Bitlis City. It can be said that these headstones have been designed as an "earthwork".

The function and context of the figures which are related to the old times was so different, nevertheless the messages which some of them have got, still haven't been solved today.

In the 20^{th} century, many artists produced forms with either the nature itself or adding external materials, and created symbols in the open field. As of 60s, many artists have found the opportunity to exhibit their works with a new and unique vision called as "earth art" or "land art" (Brady, 2007).

"Environment can be defined as the whole of physical, chemical and biological factors that enable living live and develop and keep them under their effects constantly (Çepel, 1992). Dialogue with the environment is an existential search for the visual arts, as it is for all arts. This is a material and semantic dialogue both with the society and directly with the physical environment. However, modern art neither has to have a social mission, not visual arts have a mission of embellishing the physical environment

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(Bilsel, 1997).

Movements and formations that emerged after 1960s, didn't only change the production techniques, corporate structure and consumption models of art, bot also produced innovations in issues such as, the perception of art and work of art by the society, materials used, the variety of the techniques and the perspective of the concept of space. As of early 20th century, the changes in both society and the living conditions have been reflected on art. The structure of art, that could only be watched-looked externally changed, and a different connection with space was established. Space was formed like a sculpture, and in time space even transformed to the object itself, from being the area of creation (Morkoç, 2013).

In the field of art, after architecture, space was no more just two dimensional first in renaissance period, and depth and volume became of importance. Marcel Duchamp was the first to question the relationship between work of art and the space it was in, who exhibited daily used objects in places like art galleries and museums, criticised the authoritarian attitudes of both the objects and these places, and started a discussion on the effects of spaces on the work of art (Yüzer, 2005) (Morkoç, 2013).

In modern art, the environment the artist is in is no more an issue only, but it is also the material and the space of art. Here, a transition and a continuity was provided between the work the artist does, and the space where the work takes place (Sarıkartal, 1997)

In "1960s, sense of conceptual art arose, and this understanding revealed the concept and meaning in art. In this sense of art, which removes the limits between the artist and the audience, denies the aesthetic measures, and pushes the limits of perception with different meanings, the main emphasis has moved from image to concept. The idea that the art cannot be limited to an object or a space, suggested by the conceptual art in 1960s, produced the idea of land art. This art is produced with the human intervention of the wide spaces of the nature. There are many forms of application in this branch of art, which is produced with rocks, soil and many other natural materials (Erdoğdu, 2014).

Traditional types of art have few expectations from use, because we can perceive the content and form immediately. However, we cannot be that comfortable when we encounter an abstract "subject" or performance, or modern forms, such as land art or installation; these are less familiar and therefore more demanding. Because modern art is mostly unfamiliar in both the form and the subject, these works are more challenging (Witham and Pooke, 2013).

"Environmental Art" became more distinct especially in the 20th century, when industrialization and mechanisation affected social life and nature negatively, and became a multidimensional issue that concerns aesthetics, urbanism, social science and psychology at the same time. Until the industrial revolution, the traditional duty of the artists was being the voice and interpreter of the world-view, and the attitude towards the universe. On the contrary, with industrial revolution human became alienated to creative environment forming, became unfamiliar to the closest environment, and found itself eliminated. Industrial environment was the result of productivity, not creativity, and because human couldn't manage it enough, they became the slaves to machines. In this period, the idea of making environment and living spaces least problematic for human, became a social necessity (Hizmetli, 2009).

Environmental art is a concept that was resulted from the ideas of Allan Kaprow, the creator of Happenings, to an extent. Environmental Art refers to setting in motion the audience taken in a place, with kinetic stimulants, and by affecting their senses of hearing, touch, and even smell.

Land Art is also known as Earthworks. It arose in late 1960s, when ecologic interests developed after industrial revolution. In the same period, it was also known as Environmental Art. However, because Land Art is based on the principle of using soil and natural tools, and forming the natural environment through intervention, it has a different content. It is different from the act of creating an environment that includes an audience in with a certain purpose (Rona, 1997).

Environmental Art and Land Art

Even the concept is associated with 1960s, according to E.H. Gombrich (1909-2001), who believed art history dates back to 15000 years ago, gigantic “Nazca Lines” of huge animal figures and geometrical forms, which were drawn on Nazca Desert in South Peru, and can only be seen from a certain height, can be included in the first samples of land art. Nazca Lines in Peru were created between B.C. 20 and B.C 700 (Gombrich, 2007) (Figure 1).

Figure 1. Nazca Lines, Peru (URL 1).

Environmental art has been a multidimensional issue that concerns aesthetics, urbanism, social science and psychology at the same time. It became more distinct especially in the 20th century, when industrialization and mechanisation affected social life and nature negatively.

Environmental Art refers to setting in motion the audience taken in a place, with kinetic stimulants, and by affecting their senses of hearing, touch, and even smell (Rona, 1997). “Environmental artists”, who created their works as a reaction to negative living conditions that were resulted from the industrial revolution and when humans became slaves to machines, aimed at decreasing the problems in the environment and life spaces by taking the works of art out of the museums. Environmental art was expressed with closed and open spaces and has produced and is producing striking examples both in rural and urban areas (Figure 2).

Several works of art challenge artificial urban environments, and were created as a reaction to the competitive attitudes of cities. One of the artists filled the gallery he opened with knee-deep rich soil, while another covered a car park in New York with salt used by bakers. On the other hand, some artists produced their works simultaneously with the architecture, instead making later additions to the architecture works, like a decor (Lynton, 1980).

Applications of land art, which was considered synonymous to “environmental art” in the period it arose, present different types of works that traditional works of art. Some of the formed works of art can be perceived from a space, or photographs, films or videos; and the artist can make money selling these. Application of some works requires machines and workers. In this type of works, the artist can re-arrange the big parts of the earth, cut frozen surfaces of rivers in accordance with various motifs or create new forms on a plowed field (Lynton, 1980). Land art is production of an attitude that "makes nature visible, aims at raising awareness on the nature, and blesses nature against technology (Antmen, 2010). In land art, artists don't have a mission of representing reality, as in traditional arts, they aim at carrying nature directly to the centre of artistic production in all means.

Today's sense of Land Art, forms the relationship between the Archaic and Modern. That the works are created in areas distant from civilization, such as deserts, mountains and seas is similar with pre-historic (Danabaş Tuncer, 1998). Besides sphinxes and rock temples in Egypt; tombs on the apex of Mount Nemrut are the examples of Land art in Turkey (Hizmetli, 2009).

Figure 2. Brazilian Blue Granite Sentinel, Richar Erdman, Zürich (URL 2).

Philosophy of Land Art

Besides the applications that can be referred as intervention to nature, and therefore to landscape, some artists aimed at contributing to nature visually, by placing the forms of their design. In time, land art transformed into digging tunnels and ditches with bulldozers and dynamites; intervening in rivers and seashores, and even creating some environmental events in places distant to civilization and documenting of these. On the contrary to its interest in the environment and nature, nature was destroyed for some works, which was heavily criticised.

Land Art, which, it is accepted, was "born" in 1967, is to be understood as a protest against the artificiality, plastic aesthetics and ruthless commercialization of art (Weilacher, 1996). Many of these works have arisen draw attention to man's carelessness in stripping the planet and leaving behind ugly scars. Where in some of the works there is simplicity and in others, complicated messages to be interpreted (Waymark, 2003).

Besides land art and conceptual art minimal art is the other dominated movement of the sixties. In a complete rejection of the gaudy imagery of Pop Art, Minimal Art returns to fundamental forms, orders and structures. Rather than sculptures, minimal art works have a strong relationship to space. Like minimal art, land art is to be understood as a protest against the artificiality, plastic aesthetics and ruthless commercialization of art. Because of the intention of the artist to give nature a specifically human marking as a manifestation of man’s spirit and creative power, land art become distict from minimal art, in contrast to the purely objective approach to Minimal Art (Weilacher, 1996)

Artistic tendencies in 1960s had political and social missions. For this reason, artists had to get out of the galleries to exhibit their works and reach at different audiences. Accordingly, many performances and Happening activities were carried out on the streets, in theatres or other public places. These movements arose as a result of the necessity to produce the art and culture everywhere and in a way to reach everyone. By ignoring the traditional gallery space, and using the concept of “Translocation”, these artists became the pioneers of those names "Off Spaces", who were normally not interested in art and worked and exhibited their works in alternative spaces (Morkoç, 2013) (Hizmetli, 2009).

Many of the art movements bear the effort to save the art from traditional value judgements. That the work of art is transformed into a merchandise, which can be bought with money, and therefore serves the liking of certain economic sections is criticised. It can be claimed that these works of art can exist freely of the audience (Çelebi, 1998) (Weilacher, 1996) (Hizmetli, 2009) (Germaner, 1996)

Land Art, which shifted the object from the centre of aesthetic awareness, and instead presents those who perceive this and the environment surrounding them, provides an alternative to the traditions of creating art. Land Art claims that the audience and the artist should not be observers only, and take participating roles in the work of art (Akyüz, 2000).

Conceptual art arose as a reaction the gradual transformation of art into merchandise, and is interested in not what the artists does but why they do it in this process. Conceptual art takes art not in a way limited to a certain branch of art, but as a whole. For this reason, conceptual art is frequently presented with happenings, environmental art, land art, body art, arte povera and video art titles (Hizmetli, 2009). According to Rogers (2001) “Although earthworks have a materiality that transcends a strict definition of conceptual art, the earthworks movement is nevertheless contemporary with, and part of the conceptual art movement”

Land art has the desire to reach human conceptually. Artists aim at enabling people to re-see the world with their works in the natural environment. Even the purpose of land art is reaching human conceptually, the works are generally created in distant areas where human cannot see them easily. The purpose here is getting rid of the pressured of the society and civilization, and the elements of technology that deform the personality of individuals and make them of no name. After all, the works reach at audience through photographs and video recordings. What is meant by the claim of “reaching humans conceptually” of land art should be this (Hizmetli, 2009) (Avşar and Gedik 2014).

In conceptual art, form is in the background, while the ideas in the foreground. The idea of the artist can be expressed with numbers, photographs, words or any other way. Conceptual art was known as a theoretical act. This is resulted from the fact that conceptual art isn’t any object that can be observed in any way and that the work is transformed into a thinking object as of the first moment of observation (Bağatır, 2011)

The concept of “environmental and land art” referss to a wide range of artworks, from small sculptural objects to grand gestures in the land, and from impermanent ephemeral works to permanent ones. These forms of art are best known for being site-determined and in the land or environment itself, that is, outdoors within more natural settings. If its made a comparison, it can be said that, land artist use nature as material like the sculptors and other artists but they also use it for subject and setting. Given the diversity of this genre, I distinguish and clarify different artforms as they become relevant to the arguments that follow (Brady, 2007).

According to Kastner (1998) Michael Heizer, Robert Smithson, Walter De Maria, Dennis Oppenheim and Robert Morris have created very initial samples of land art and these are entitled as "earthworks" an they comprise "site-specific sculptural projects" which take advantage of the substance found in nature in order to invent new forms, new models, and new concepts. He says that the works that introduce inorganic objects into the natural spaces has almost same purposes. They are "time-sensitive individual activities" within the landscape as personal and social involvement into the land (Gerekli, 2009).

Both ethical and aesthetic objections have been raised against some forms of environmental and land art or particular artworks. For example Christo and Jeanne-Claude has been criticised as 'artifacts [that] forcibly assert their artifactuality over against nature, by their size, their engineering complexity and their synthetic components'. They constitute an aesthetic failure in so far as they are 'destructive of their natural setting within the aesthetic context'.

According to Carlson (2000) explains, the eaesthetic affront as: 'it is a function of changing an object's kind and thereby altering its aesthetic qualities'. This type of affront is not synonymous with environmental impact, rather, it is more like an 'aesthetic indignity' or an 'insult' against nature, where nature is affronted even if there is no consciousness of an affront being made. Some art critics of the time associated the earthworks of Heizer and Smithson 'with a kind of macho aggression in which the violation of the earth with huge mechanical diggers was seen as a raw assertion of male authority over Mother Earth'. Robert Smithson was not an ecologically sensitive artist and his works have been questioned in terms of whether they express aesthetic regard for nature. But there is implicit regard at least in the ways his projects connect to and interact with natural processes like growth, decay, and entropy, and, in some cases, explicit regard for complex natural qualities as they emerge in works like Spiral Jetty (Brady 2000).

Land art sometimes occurs as ephemeral art. Ephemeral art, or "ephemeral gestures in the environment", lies in sharp contrast to earthworks. Goldsworthy and Singer have exemplified these kind of works. It can't be said that they are not environment activists but many of their works leave only soft impressions on the land because of their works which are in a smaller scale and the sensitive use of materials. There is clear interest in human engagement with the environment and, overall, these artists are more in tune with developing an intimate relationship with nature. Goldsworthy engages intimately with the environments in which he works, using materials from the sites themselves rather than using tools or technology. He get in touch with a site's particular qualities such as complexity, simplicity, delicacy, strength, changeability, varying shapes and textures he brings out the dynamic possibilities of art and nature through space and time (Brady, 2000).

In Land Art works, ideas, efforts and materials are spent in order to leave a "temporary" trace. These artists' digging holes in the desert or forming motifs with branches under a tree are not just lavish acts in a world where worries of aimless efforts or heavy waste exist. What land artists means to express or react to with their works is that modernism and industrial revolution destroy both the earth and social life (Akyüz, 2000) (Hizmetli, 2009).

In ecological artworks, valuing nature is the substantial isuue while the human role is backgrounded. Various forms of ecological art and eco-ventions bring attention to the non-instrumental value of nature, and in this way they constitute a type of respect for nature generated through artistic means and creative intentions. (Carlson, 2000) (Brady, 2007).

Land Artist Richard Long claims that spaces should be free and criticises the monopoly of museums, saying "it is not possible to buy and own my open space sculptures and walking trails. I like the idea that roads and mountains don't belong to anyone, but everyone" (Morkoç, 2013).

As of 1960s, artists started to transform the sceneries they presented in paintings and sculptures naturally into real spaces by intervening in the land. These artists, who used "bulldozers instead of brushes" as defined by one of the pioneers of the movement, Robert Smithson, signed a very interesting installation that changed with the own course of the nature, and eventually destroyed in time (Smithson, 1998).

"Environmentalist" movement is also in the basis of land art, besides the artists' reaction to traditional gallery and museum places. Artists can express themselves more comfortably in free lands, than limiting rules of galleries (Gerekli 2009).

Some Works of Land Artists

The difference of land art than other movements in its period, in terms of use of space is that it was realized in wide spaces in the nature, in a way unique to that space. Artists used the nature both as the space and the material, using natural substances, such as sand, rocks, soil, etc. The land swallowed the object contextually, and became the object itself. "Spiral Jetty" (1970) by Robert Smithson (1938 -73) is one of the most important examples of this art. For the work of art created in the Great Salt Lake in Utah state of the USA, 7000 tons of soil, rocks and salt crystals were used. Spiral form of the 'Jetty' makes a reference to the legendary vortex believed to exist in the centre of the lake. This work of Smithson is buried under water from time to time based on natural changes (Antmen, 2008). The jetty so long licked, covered and embraced by the lake, now sits alone arid and rocky about a half mile from the water (Hogan, 2008).

Spiral form used by *Smithson* in his works of land art has been considered as the symbol of re-birth, moon and the sun, the one growing and eternal, and the re-birth of life and development as of late Paleolithic period. This way, Smithson creates a time stream that is both forward and backward with the spiral form. The artist used this form also in his works of land art titled Spiral Hill and Broken Circle (Danabaş Tuncer, 1998) (Fig. 3).

Figure 3. Robert Smithson, "Spiral Jetty", Great Salt Lake, Utah, ABD, 1970 (URL 3).

One of the substantial land artist Goldsworthy says that: “Nature is intensely beautiful and at the same time very unnerving, and at times deeply frightening. You feel it as soon as you go out to the land, where everywhere you go things are dead, decaying, fallen down, growing, alive. There’s this incredible vigour and energy and life. And it’s sometimes very difficult to deal with.

I would hope that I don’t have a kind of romantic view of nature. I do feel the beauty of it, for sure. But it’s a beauty that’s underwritten by extreme feelings” (Brady, 2007). Since Smithson and Hezier were interested in the anthropological and archaeological history of the space, photographic value of the space was not very important for them.

He claimed that he worked to recover the abandoned, consumed spaces of no use, and attract the attention of the audience to historical, geographical and cultural dimensions of the space. When he mentioned Spiral Jetty, he claimed that the work restored the honour of the space of application. Smithson’s Land Art meant to start a movement to be used as a bridge between industry and ecology in re-functioning the destroyed industrial areas. According to Smithson, the artists should face the problems encountered by the ecologist and industrialists of the time (Akyüz, 2000)

Bulgarian artist couple *Christo and Jean-Claude* used textile either to cover the structure or create liveliness, dimension and visuality on surfaces in their applications in which both the function and visuality of the material were in the foreground. By covering structures with textile material or re-organizing the surfaces with textile material, the provided a new dimension in visual perceptions. This way, forms came to forefront as whole, rather that with their details, and they obtained very unique images with artistic and conceptual usages. Different dimensions of nature-textile and architecture-sculpture interactions are presented in couple’s works. First large scale work of the couple “Wrapped Coast” was applied in a bay in Australia, Sydney, in 1969. 2.5 km long area on the coast of the bay and the rocks behind were packaged up to 26 meters height. With this application, the couple created the “largest” work of art that had been created till then (Oskay and Keser 2015). Textural feature and transparency of the fabric used in “Wrapped Monuments”, which were Italian King Vittorio Emanuele II and Leonardo da Vinci monuments wrapped by Christo and Jean-Claude couple in Milan, Italy in 1970, created an effect on the audience that was very different than the monuments’ old positions. With this application, they aimed at changing the perspectives of the monuments in the public area and raising awareness.

Christo’s project of wrapping objects was not lasting in the landscape, unlike Heizer and Smithson. Besides the approval and financing from the local and national authorities, Christo and his wife Jean Claude’s works were supported by many volunteering groups. According to Christo, there is mystery in everything wrapped, and that gives the impression that there is a very valuable thing inside. On important point in Christo’s works was that, they were in interaction with the local people, and the projects became “incidents” with the participation of many people during realizations. This way, the artist tried to change local people’s perspectives of the nature and cultural structures. Artists’ projects were also performances (Üstüner, 1996).

In order to mediate the natural and to create a land art form of more harmony and ecological responsibility, New Yorker artist *Alan Sonfist* embarked on a quest of spatial and historical intervention. “Time Landscape”, which he created with this purpose in 1965 and stills exists today, is a gigantic project realized with the restoration of five neighbourhoods in New York in 17th century colonial period style.

Figure 4. Christo and Jeanne-Claude Valley Curtain, Rifle, Colorado, 1970-72. (URL 4).

This way, the artist made the nature and suburbs, modern and historical, developed and authentic stand together, and started a discussion on the differences between them. The soil on the corner where La Guardia and Houston Street crosses in Sonfist's project was revived, local plants were planted, natural elevations were re-created. The artist created a forest in a 14X61 meter field, where housing was intense, started wild life in this area, and used tree species that were almost no longer existed in the city. The artist emphasized the necessity that cities should re-meet their origins and traditions, and aimed at taking them back to pre-historic natural conditions (Uzunokur, 2011). According to some critics, Sonfist's efforts to re-create the "primitive nature" were the reflection of the protective understanding of ecology in 1960s. The purpose of this understanding was protecting the natural areas, and changing them back to their original forms before human intervention. When he was asked about the efficiency of his work, Sonfist said "Everybody has their own responsibility for environment. I don't tell everyone to go fight with environmental pollution. I think the main purpose here is to raise awareness on the issue in both social and political terms. Forest is one of the many responses that can be given." (Figure 5) (Akyüz, 2000).

Another pioneer of ecological art, *Agnes Denes*, produced some works of art on ecological, social and cultural issues. In her work she created in Manhattan-New York in 1982, "Wheatfield-Confrontation" she planted and grew golden wheat in the middle of the Metropolis, and reaped (Figure 6) (Akyüz 2000).
With her work, Denes transformed an inner city site, usually a much sought-after object of speculation, back into valuable, fertile land which is still able to yield essential food-stuffs. While the straw which was produced was used as fodder for the horses of New York's mounted police, some of the wheat was donated to the "International Art Show for the End of World Hunger", an exhibition held at the Minnesota Museum of Art (Weilacher, 1996).

Andy Goldsworthy is one of the most important representatives of Land Art in England. The artist, who doesn't use traditional sculpting methods very much, creates an order using the materials he finds in the nature in accordance with his own principles. Goldsworthy uses materials, such as soil, air, water, mud, sand, ice and snow along with trees, branches, leaves, and animal hide. When his works are ready, they continue to be exhibited as they are during production phase, with the changes resulting from time, wing and animals around, and many other natural factors. Goldsworthy's purpose is going beyond the visible and discovering nature's sense of functioning (Çapar, 2015).

Figure 5. Alan Sonfist , Time Landscape, aerial (2005- Image Source: Viza 629) and street views (URL 5) (URL 6).

Figure 6. Wheatfield, Agnes Dnes, Manhattan (URL 7).

The direct contact with such real things as the coldness of rain, the haviness of rock, the coarseness of sand and the gloss of smoothness of material is much reduced domain of children schizoprenics and artists. Goldsworthy himself admits: " I need the schock of touch, the resistance of place, materials and weather…" (Mc Grath, 2002).

Some of Andy Golsworthy's works are temporary, while some are permanent. Outclosure (2007), Give and Take Wall (1988), Storm King Wall (1997-1999), Montreal Arch (1998), Garden of Stones (2003), Roof (2004-2005) are artist's permanent works. "Pool of Light" by the artist was a work he did on order in Charente-France. He created this work using the trunks and branches of chestnut trees that fell and meant to be burnt. He applied the circle form in the centre of the branches he placed on a rectangular area in front of the chateau with 90 degrees angle, and placed chopped logs here. The work of art changes during the day based on the incident angle of sunlight (Fig. 7) (Uzunokur, 2011).

Materials Used, Time, Location-Space-Place

In land art, for the sake of simplicity natural materials are used typically. However, the materials used the means of conveying inherent meanings and its own history and mythology. At the same time, the material used in the work influences the figurative and symbolic message of the work (Weilacher, 1996). According to Brady (2007), land artists will often use nature as material, subject and setting. If the artist sometimes specifically wishes to emphasize the change, he/she may select materials that alter rapidly; such as earth, stone, wood, plant, and snow and ice (Büyükgökçesu, 2011).

Figure 7. Andy Goldsworthy, Pool of Light. Charente-France (URL 8).

Land art references time in some way. The works which leave permanent marks on nature references to the time that the work has created. However land art uses both the ruinous and references to structures dating back to early history to put time in a historical context. To heighten the awareness of time, art in the landscape incorporates transient aspects and makes use of certain symbolic forms (Weilacher, 1996)

According to Naukkarinen (2007), it is possible to see differences both in the qualities of the space and the location of the work of art. This difference results from the size of the space and the relationship between the work of art and the space or other elements forming it. Both the material used and the size of the work play an important role in this relationship. Based on the dialogue between the work and its environment, the qualities and the characteristics of the space, and the atmosphere can vary. Some works of art may dominate their spaces, some are submissive, some may disturb or break the space or create tensions, some make the space threatening, attractive or unwelcoming (Büyükgökçesu, 2011).

While most of the earthworks could have been made in any one of a number of similar places, mostly the boundaries between the works and their settings are not at all clear. These discrete objects, intended for isolated appraisal, but they are fully engaged elements of their respective environments Compared to the traditional sculptural preoccupations, the shift towards the periphery, brought along the emergence of diverse forms and structures. "Such as Robert Smithson's Partially Buried Woodshed, Robert Morris's Observatory; permanent or impermanent site markings – "marked sites" and "impermanent marks" – , Robert Smithson's Spiral Jetty, Michael Heizer's Nine Nevada Depressions, Dennis Oppenheim's Las Vegas Piece, Nancy Holt's Sun

Tunnels; “photographic experience of marking”, Richard Long’s A Line Made by Walking, Christo’s Running Fence, Robert Smithson’s Mirror Displacements in Yucatan, so forth” (Gerekli 2009).

It is possible to observe that works of art are located in both rural and urban areas, taken the locations of those works created both in nature and “with nature”. Especially the first examples of land art were formed in spaces away from cities, in natural environments without any human intervention. In addition, in some work s, a dialogue with densely populated, richly structured cultural landscapes such as public spaces in cities can be observed. In both situations, the scales of the works can be variable (Weilacher, 1996). Land art works can be seen in deserts, forests, agricultural landscapes, industrial and disrupted landscapes and urban landscapes.

Effects to the Landscape Architecture

Land art, which is in direct relationship with landscape architecture, both was fuelled by the development of landscape architecture and fuelled the landscape designs. "Landscape architecture, cannot be abstracted from art and it should be considered as a “form of art” that can create its own movements.”

There are “essential” differences between landscape architecture and land art approach, especially in the arrangement of urban landscapes. Unlike landscape architects, land artists generally take nature not only as a material, but also as “subject” and “space”. Moreover, land artists can create temporary works taking the concept of “time” that presents the strength of their works. Landscape architects, who have a detailed knowledge of environment and ecology, have mostly created environment friendly designs, while land artists have been affected from historical, cultural or symbolic phenomena as they created their designs.

By making new ways in the issues of what is presented to human and human perception, land art enabled the discipline of landscape architecture develop a new design language. With this effect, landscape architects started to take land not only as a space, but also the design itself. With its philosophy, land art provided landscape architecture with new expansions. This way, landscape architects balanced themselves between art, design and environmental responsibilities (Büyükgökçesu 2011).

Land Art in Turkey

Applied examples of land art in Turkey are comparatively fewer. In 1974, Turkish artist Yücel Dönmez conducted an art event in Kuartat valley in Altiparmak section of Kackar mountains, and called it “Nature Arrangement”. In that period in Turkey, visual arts were still known as the oil paintings on canvas, and country hadn’t preceded much in this branch of art except for some performance activities. Yücel Dönmez’s nature arrangements were criticized both positively and negatively: some believed this kind of art was meaningless as it wouldn’t provide any profits, while some other rejected them claiming that no arrangements could be conducted within art. In 1975, Yücel Dönmez was the first artist to draw a picture on snow. Yücel Dönmez’s Land Art projects continued many times in Erzurum Palandoken, Uludağ, Chicago Grand Park and Antalya Saklikent ski resort between 1974 and 2013.

Yücel Dönmez’s works and the exhibits he participated in have created excitement among many artists for the sake of Land Art. It is documented more everyday that Land Art has an important place in the branch of visual arts, where modern art is proceeding rapidly in every dimension. Land art, which was applied by approximately 7-8 artists in the world 40 years ago, is applied by tens or maybe hundreds of artists only in Turkey today (URL 9).

Figure 8. Yücel Dönmez, picture on snow, Saklikent, Antalya, 2013 (URL 9).

PMO Genc (Young Chamber of Landscape Architecture) Düzce Land Art Workshop, organized by TMMOB (Union of Chambers of Turkish Engineers and Architects) Student Members Commission (PMO Genc) Düzce University representatives, was held in Düzce on 13-14-15 May. Participants, most of who were Düzce University students, gained experience by practicing the relationship and interaction between landscape architecture and art (URL 10).

DISCUSSION AND CONCLUSIONS

It is considered odd that artists are interested in many problems that aren't of concern for many people, and reflecting these problems in their works in the nature with their own style. However, the people on the street in western civilizations take this more maturely. The way to develop such a perspective in Turkey is regarding differences less strangely, and thinking correctly of what is seen and perceived. While some things can be accepted as ugly, we can comprehend what they are in time.

As it is seen, both land artists and landscape architects impressed by each other. Such that, land artists highly influenced by garden art and ecological issues. Landscape architects highly impressd by especially the minimalist works of land artists as well. Both land art and landscape architecture can help us decode our multiple, often conflicting attitudes toward nature, reviving old myths when appropriate and shaping new paradigms when necessary. By the 1980s, land artists were working much more actively on public spaces than on desert areas. In search of this public, they have returned to the city and have designed parks and gardens in urban landscapes. With this attitude, land artists were trespassing on the territory of landscape architects. Isamu Noguchi, Kathryn Gustafson, Robert Irwin, Peter Walker, George Hargreaves, Martha Schwartz are some of them.

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Chapter 25

Purposes of Waterscapes Usage in Landscape Architecture

Tuğba DÜZENLİ[*], Doruk Görkem ÖZKAN[**]

INTRODUCTION

In the recent times, people's interest in the urban environment has increased along with the developments in living standards, thus, the planning-design of waterscapes has started to attract more attention, and the living spaces with water elements have become an indicator of fashion (Lingyu and Yongkui, 2011). This interest in water is not a new phenomenon, it is known that civilizations established their settlements close to rivers, streams, lakeshore or water resources within the historical process. Although water has been one of the main sources of life throughout history, it has also been a source of attraction in spaces where it is used. In many communities, water has affected and even identified the epics of creation, the most basic element of mythology, and the belief systems. In this respect, the old communities' relations with water or water perceptions are quite different, more abstract and much broader than that of today's community. (Lingyu & Yongkui, 2011; Faggi et al., 2013).

Water, which has been the basic element of life throughout history, has begun to be used in larger areas along with the technological developments. Water, which is used for drinking, washing, and irrigation, has eventually become a tool which indicates status, carries a monumental meaning, is entertained, watched and listened and provides comfort by assuming different functions. Water has begun to carry different meanings for the people who have been stuck within the environment created by them along with the increasing urbanization and increase in concrete structures. People have created spaces that meet their physical and psychological needs within the city by designing the spaces where they live and their environment, found an opportunity to resort to nature with the water element used in these spaces, rested by the appearance and sound of the water, and used water as the focus in various activities.

Water, mankind's most important source of life, is an important element that can be included in the landscape design and is a unique material in terms of landscape design (Burmill et al., 1999). It is one of the most colourful and exciting elements that can be used in landscape design (Rees and May, 2002). Water has an effect of relaxing people and detracting from stress in the space where it exists along with its therapeutical feature. The flexibility of water attracts attention and arouses curiosity. The water element in open spaces has a high value because of its aesthetic value, sensory incentive, social function and psychological benefits for landscape architects, environmental designers, psychologists, sociologists and for the community (Huang, 1998). Many studies have demonstrated the positive effects of water. While Herzog

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determined that the environments with the water element are mostly preferred compared to those without it, water was suggested to have healing psychological effects in the studies of Ulrich (Herzog,1995; Ulrich,1981). According to Schroeder (1987), spending time in urban open spaces where water exists reduces stress. The movements of water at different speeds can impress and relieve people and entertain them by taking them away from boring thoughts. The designs identified with water attract people's attention, make the environment more explicit and increase participation and enthusiasm (Orions, 2001; Sorvig, 1991; Campell, 1994). Nasar (1987) also suggested in his studies that water increases the visual satisfaction.

Water is a flexible element that can easily be applied to parks, gardens and urban open spaces, and it also constitutes the focus of attention even in small sized usages. The recreational use of water dates back a long time. People have monitored water by bringing it into outer and indoor spaces and giving various forms to it such as pool, cascade, fountain and public fountain and have developed various water-related games. Throughout history, water has refreshed, pleased, supported morally, calmed down, inspired, affected and entertained people, glorified the spaces and cleared the air. The symbols used in water elements have revealed the ideas and messages related to people's imagination, passion and victories on nature. For these reasons, the spaces with water element are regarded by people as the places to go on memorable important days. Water elements serve as attractive spatial components in important human events such as weddings, family gatherings, festival holidays or urban events. Water reminds us of renewal as the elements depicted by drawings, books, photographs, films or postcards because it has always been a source of new beginnings (Symmes, 1998). Water adds richness to space by its attractive feature, the physical image in architecture, natural and symbolic meaning. It plays an effective role in providing the functional and aesthetic requirements. With its acoustic, reflective, cooling, refreshing and relaxing features, the sound of the water flowing in the urban space constitutes a unique structure in the space with its attractive effects (Rubenstein, 1992). According to Booth (1983), large water surfaces create a cooling effect in immediate environments during the summer months. According to Harris and Dines (1998), especially the use of water formed by spraying and evaporation creates a cooling effect in the immediate environment of the space where it is used. The developing technology has created new opportunities for water-based recreation, and this has also led to a further increase in the use of water. Regardless of cultural level, traditions and living standards, although the interest in the water shows stylistic differences, water has been one of the common aspects of all people.

According to Owen (1991), the water itself provides a magnificent potential for activity. The use of water has been recently recreational, rather than industrial. It serves as a magnet that attracts people to city centers and creates vital points for activities. In various circumstances, coastal spaces, city centers and natural areas where people can meet constitute ideal spaces for markets, bars, restaurants, exhibitions and boat tours.

Cultural differences and climatic and topographic conditions have been the factors that have diversified the use of water. The water, which was used on limited surfaces by narrow channels in arid climates, rose and babbled in temperate climates where water can be found more easily in the form of larger water surfaces. The usage styles of the water element in design have come until today from all kinds of culture by being changed and affected by each other in time and continue to sustain explicitly with new trends.

Briefly, the use of natural elements in the landscape design like water is very important from the aesthetic and psychological aspects and has a big place in the history of mankind (Huang,1998). The intended purposes of water which is an indispensable part of life and design in the landscape architecture, its environmental impacts and its importance and place in design, and the design and planning criteria that could establish guidelines for best practices were investigated in this study. Design proposals were developed for different types of water usages at the end of this study.

USAGE OF WATERSCAPES IN DESIGN AND LANDSCAPE ARCHITECTURE

Water has always maintained its place as one of the most important design elements in successful designs devised from the past to present. The designs related to water have always attracted people and aroused interest on them. Water has been used for different purposes as a design element with its symbolic, visual and auditory features. It has helped to provide the effect which is desired to be created in design by causing different reactions on people with its different circumstances. The features of water lie behind its endless diversity. Water flowing at variable speeds (still, moving) can be deep or shallow. It acquires numerous colors and creates different sounds. Each feature of it gives life for a different application and space usage in landscape designs (Simons,1983). The movement and stillness factors are always included in the essence of designs related to water.

Designers generally use the visual form and function of the water in their planning. They address the movements, form and model of water and its endless transformation from source to the sea. This transformation starting from raindrops and going up to fog, sprinkle, fast flowing water, creeks, streams and seas has an important place in human memory (Blair, 1996).

Water is used to enhance the visual quality of the space in designs. However, water has also healing psychological effects in addition to its various physical features (being a noise barrier, changing climate, etc.). In his study, Ulrich (1981) investigated the psychological effects of natural and artificial environments. In this study, the visual survey was applied to the subjects using slides. Slides were divided into three groups including examples of nature containing water, plant-weighted examples of nature and examples of urban without water or plant weight and were presented to the subjects, and they were asked to evaluate them with the attributes they ascribed. Consequently, it was revealed that water has a relaxing effect, decreases the mental fatigue and relieves the anger by increasing the interest of the observer's visual contact with water. Furthermore, it was also observed in studies carried out that the hospitalized patients recovered faster when the landscapes containing water were demonstrated to them, and that their fears and concerns decreased (Campell,1994; Orions, 2001).

In addition to its visual feature, the sounds of water produced during splashing and gurgling provide auditory satisfaction. The coolness created by water through sprinkling relieves the hot and dirty cities. Water is pleasing and decorative with its cooling feature. The aesthetic purposes of the water are divided into 5, these are visual, auditory, psychological, tactile and cooling purposes. Water has functional features as well as aesthetic qualities. Water is also a material which is penetrable and can be used for a purpose. The functional purposes of water are divided into 3, there are recreation, circulation control, and pragmatism (Harris and Dines, 1998).

Although water sometimes creates cheerful, crazy and funny feelings, it can make someone feel calm and serene, can create cheerful currents by creating elegant curves or squirming, and sometimes it creates different forms by covering sharp surfaces. All these are factors that should be taken into account in landscape design (Blair,1996). Positive factors such as touristic, economic, social and cultural events brought by water elements used in urban open spaces should not be forgotten.

TYPES OF WATERSCAPES

First of all, water should be classified for the correct use of water elements in designs. Classification is as follows;

Table 1. Classification of Water

Category	Effect	Type
Still Water	–	Pool Lake Pond
Active Water	Active Waters from Top to Bottom under the Influence of Gravity	Waterfall Stream River Cascades
	Active Waters from Bottom to Top by Applying Pressure	Fountain Jets

Water does not have its own shape, it takes the form of the location where it exists (Burmill et al.,1999). Water, which sometimes fills up the pools and is sometimes folding in valleys, is either still or moving regardless of where it exists.

Still Water

The water that complies with the form of the ground on which it exists with the influence of gravity and is in a static state is called still water. Still water is visually soft and uninterruptedly gives the mind the possibility and encouragement of thinking with this feature. These types of water refer to balance against the force of gravity. Historically, the still water surfaces were important design elements in the 17th-century French Renaissance gardens and in the 18th-century British landscape (Booth, 1983). The still water element has also a relaxing and calming feature in the area where it exists. Still water serving as a reflective and calm water mirror in designs expresses an aesthetic value and has functional features. Along with the moisture and coolness it emits around, it has functions such as attracting people and bringing together the individuals around it as a focal point. The still water, which is used as the main element in designs, is used in quiet and passive areas to create a peaceful effect, and it is used in active areas to add a significant air. Pools, lakes and ponds are still water surfaces. Still water surfaces have a reflective feature (Burmill et al.,1999). It attracts people with the reflections created by it. In Greek legend, the fact that Narcissus fell in love with his own image he saw on water is due to the hypnotic power of the reflective surface.

Bachelard (1983) argued that water mirrors reflect the world's impressionistic image and that the images on water are more innocent and natural from the fact. The reflective water elements are used in designs to create depth, eternity, and tranquility.

Water surface adds dynamism and fantasy to space when it is supported with light (Betsky,1995).

Figure 1. Still water examples (URL 1,2)

Active waters

The active water which is visually exciting and sounds nice is a dominant element that adds life to space. The type of moving water depends on the scale and the state of the space where it will settle. Horizontal and vertical movements in various forms can be added to water surfaces (Wylson, 1986).

Active water is an important design element with its audio and visual effects. In the crowded urban life, moving waters create a more peaceful atmosphere by clearing annoying sounds. They attract the attention of users to a certain point (Chanson,1998). In his study carried out with the photos taken at different flow levels in two rivers in California, Litton (1984) demonstrated that the (moving) parts flowing by irregular changes were more preferred than others. Moving waters are divided into two;

Top-Down Active (under the Influence of Gravity) Waters

The water actively moves over any object towards various surfaces and forms along a top-down order by the influence of gravity (Figure 2).

The most extreme example of water's downstream is the waterfalls and cataracts with unrestricted movements. They precipitously fall from top to bottom by creating large, discontinuous or fractured surfaces (Harris et al., 1997). Designers use the advantage in the sound of the waterfall in heavy traffic points. In his study in Greenacre park (a heavily used park in the city center of New York) in 1977, Burden revealed that people began to leave the space by giving up chatting when water flow in the waterfall was stopped (Huang,1998).

Streams and creeks move in a gentle slope by creating rough or calm currents (Harris et al., 1997).

The cascades creating stepped forms are formed by the combination of water with architectural forms. The step geometry was imitated from topography. Water steps increase participation in recreational activities and the space perception (Chanson,1998).

Bottom-up Active (Applied Pressure) Waters

Fountains and jets are the systems that strongly uplift water upwards (Figure 3). They can assume the focus task in the space and constitute the center of activities by creating vertical linear water columns or water clusters (Betsky,1995).

Figure 2. Examples of top-down active water (URL 3,4)

Figure 3. Examples of bottom-up active water (URL 5,6)

INTENDED PURPOSES OF WATER ELEMENT IN LANDSCAPE ARCHITECTURE

Water element is one of the most important components in open spaces. Water element has different functions and different intended purposes as a space component. In this study, the intended purposes of water in landscape architecture were divided into 6 groups including edging, orienting, meaningfull, focus, and continuality.

Edging

In general, "water" is an edging element inside the open space. Fittings and accessories can be fixed depending on the limits of the water element. In addition, a water element can be used as a limit element that separates the activities in the space and provides the visual or auditory privacy, outside of its own functional duties.

Water plays a role in the space organization as a restrictive or closing element because the person has to walk around instead of passing through. In addition, its physical movement is a wall that visually blocks as an effective barrier. This is the reason for water's traditional positioning at the center of the space. The small pools placed in the middle of square or rectangular spaces tend to divide the space into quarter parts and to reduce its visible dimension (Eckbo, 1950).

The water element attracts the users' attention by preventing the noise via the sounds created by it in urban spaces with high levels of traffic noise. Generally, a peaceful environment is created by preventing noise via falling or moving water elements.

Studies have shown that edging elements psychologically relieve people. Ruddel and Hammitt (1987) revealed that people preferred restricted regions. Appleton (1996) revealed that the most preferred landscapes are those close to boundary elements allowing for taking refuge. Users prefer spaces where they can easily see without appearing and they are away from the annoying sounds (Campbell,1994). When the water element is used as restrictive, it can create pleasing spaces by meeting these requests of people (Figure 4).

Figure 4. Examples of edging waterscapes (URL 7, 8)

Orienting

Water element also plays an orienting role in open spaces. The effect of water element is considerable in the shaping of the space. It can direct people to the point which is desired to be emphasized according to its usage. The router water elements are also used to divert the traffic for security and safety and to ensure an orderly progression inside the space (Harris and Dines, 1998).

In general, linear water channels or rectangular pools have an orienting effect. These types of water elements can comply with transportation and walking activity (Figure 5).

Figure 5. Examples of orienting waterscapes (URL 9,10)

Meaningfull

In architecture, water element adds richness to space with its physical appearance, natural and symbolic meaning. Waters have had symbolic meanings since ancient times. In all cultures, water is a part of cleaning and purification associated with sacred values. The complementary elements involved in the design of pools such as sculpture were used as symbolic tools in the city by giving various messages (Symmes, 1998).

In other words, water element can also be used as a symbolic or meaningfull. For example, water can also assume a symbolic mission as an element separating the activity areas as well as its cooling mission or a water element established for noise barrier may also serve a decorative purpose (Figure 6).

Figure 6. Examples of Meaningfull waterscapes (URL 11,12)

Focus

Sometimes, the water element in the space constitutes a powerful element by separating from the general composition of the space functionally, symbolically or stylistically. This also allows for the use of water as focus. These types of water elements can comply with gathering and waiting activities.

The water element with fountain to be placed in a vital point, a square or a pedestrian axis in the urban space can bring a focal point and landmark character to that space and also will add value to the space as a landscape element that will provide noise control and encourage people to use that space (Figure 7).

Figure 7. Examples of focuser waterscapes (URL 13,14)

Continuality

Water can serve in a space by arousing a sense of continuality and can soften the character of the space (Harris and Dines, 1998). The water element in the space can show a feature of providing continuality when it moves by following a circulation. These types of waterscapes can comply with walking and strolling activity (Figure 8).

Figure 8. Examples of provider of sustainability water element (URL 16)

GENERATION OF DESIGN SCENARIOS FOR THE INTENDED PURPOSES OF WATER ELEMENT

While preparing scenarios, an urban square was designed, and the different uses of water were illustrated by being designed for different purposes in the same space. The design of the water element with a fixed space changed depending on the task it assumed. The scenarios suitable for different tasks of water were prepared along with plans and sections (Figures 9,10,11,12,13).

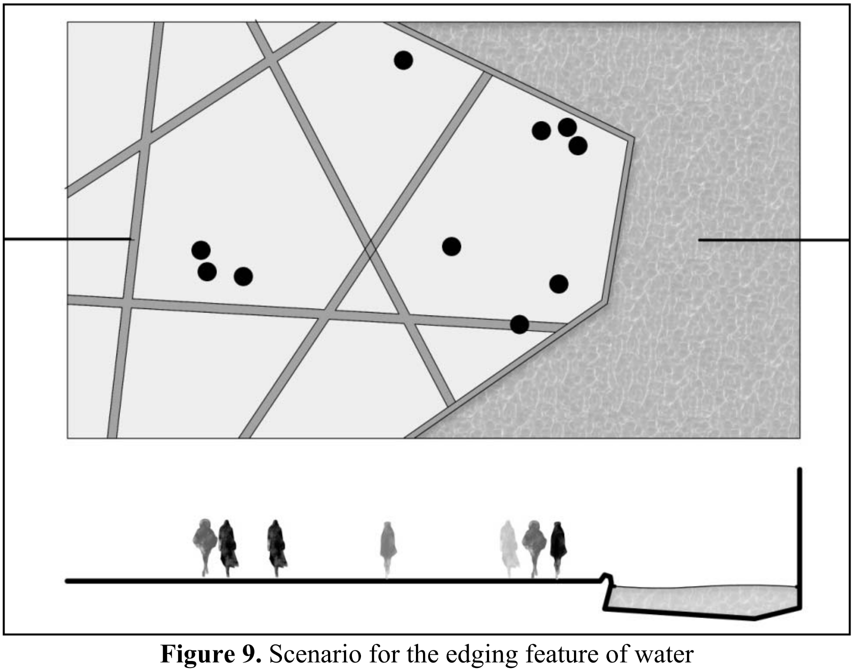

Figure 9. Scenario for the edging feature of water

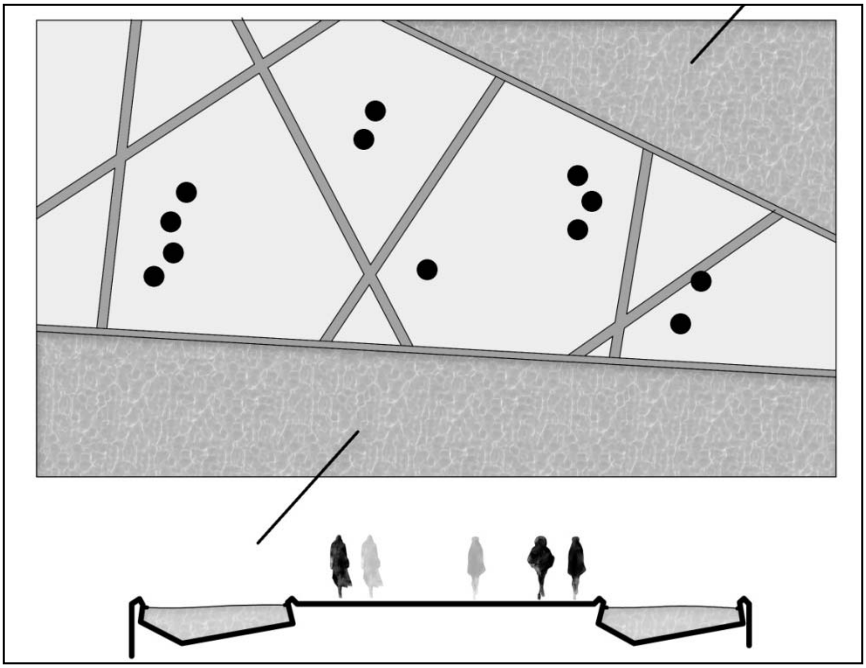

Figure 10. Scenario for the orienting feature of water

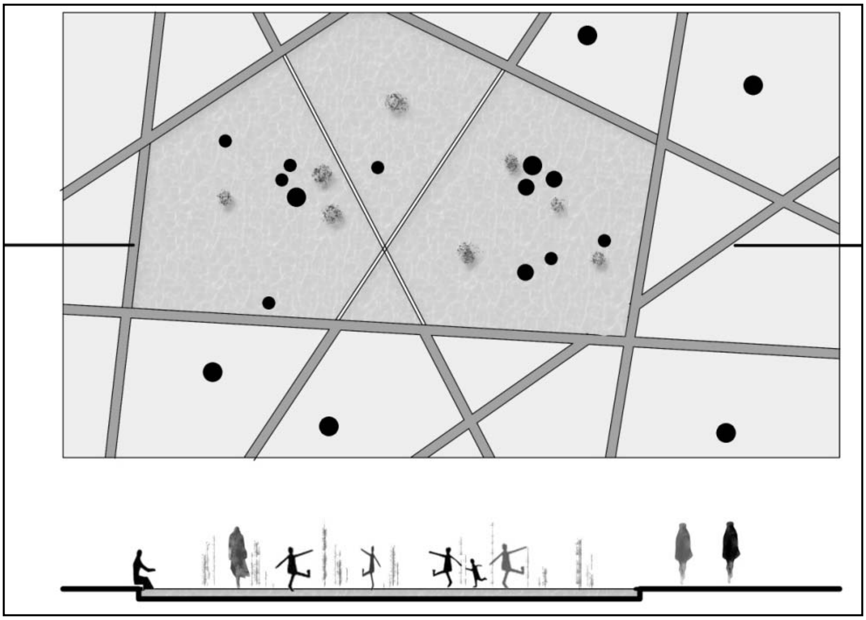

Figure 11. Scenario for the meaningfull feature of water

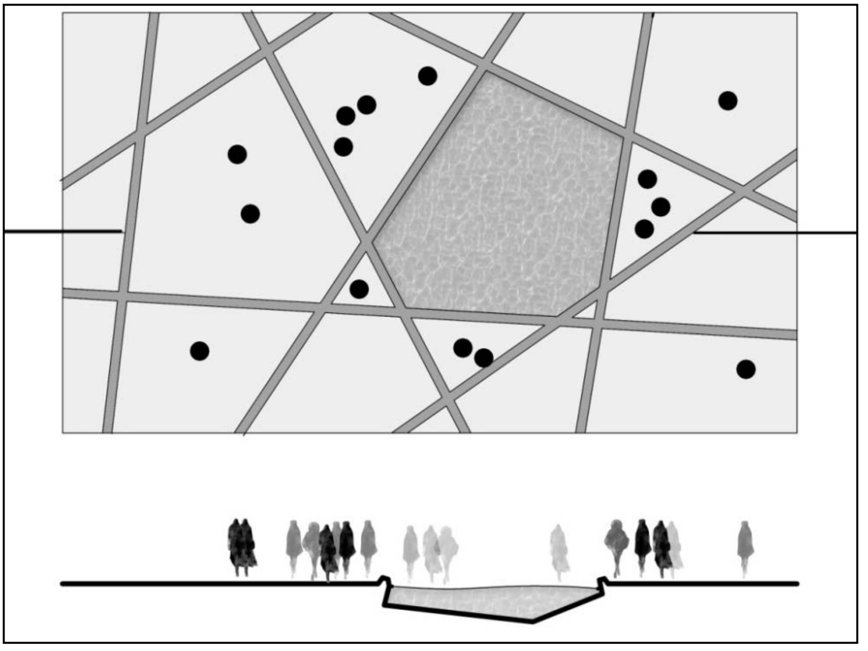

Figure 12. Scenario for the focus feature of water

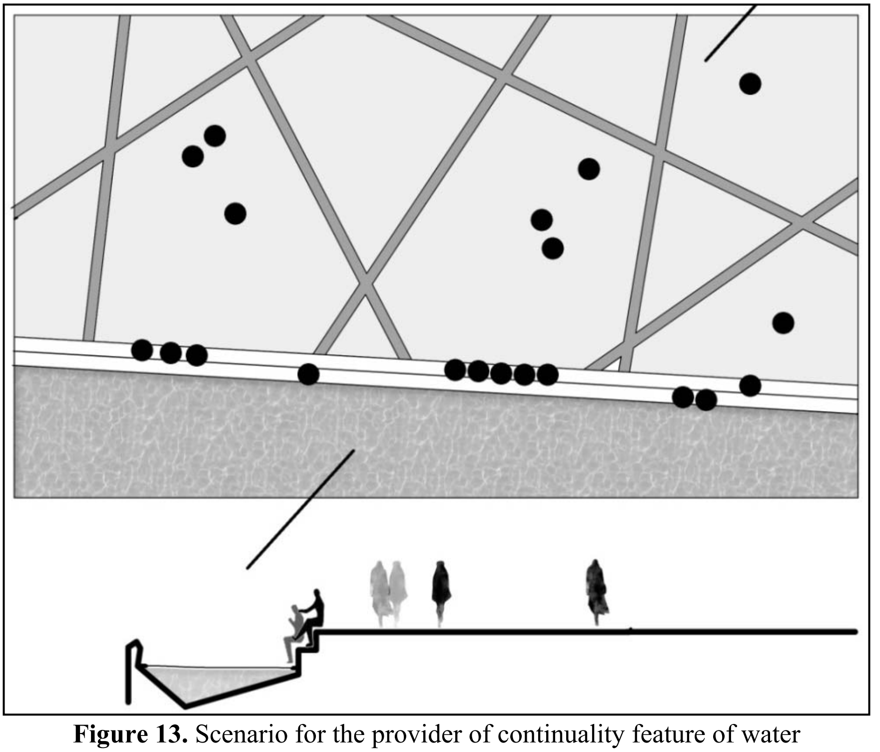

Figure 13. Scenario for the provider of continuality feature of water

CONCLUSION

While waterscapes express the cultural importance of water for humankind, they are also in compliance and in harmony with the hydrologic cycle in nature. Waterscapes comprise the use of all water elements from small to large and focus on the use of water elements in the landscape design of an area. These areas can be both natural elements (rivers, lakes or seas) and artificial elements. Pools, waterfalls, and water elements can be added to complete a landscape, recreational space or focal point. Natural and artificial water elements can be used together. In both cases, they will act as designed natural ecologies and artificial ecologies in the case of benefiting from the dynamic natural processes. Therefore, water element is an important element that should be used cautiously in landscape designs.

There are many reasons for the use of water in the landscape. Although water elements make positive contributions to designs from an aesthetic point, they can also be used to provide safety or security for recreational purposes or by directing pedestrian circulation. While water can create a focal point, it is also an element providing continuity within the space. Beside all these, the use of water provides a visual, auditory, psychological, tactile and cooling effect to the design from an aesthetic point, and it has many features in terms of functionality.

The landscape design should be considered as a whole in a manner sensitive to the user's lifestyle within the required comfort level limits so that the structural components and elements of the space would be compatible, useful and nice, they would provide people with happy and peaceful life. In other words, the most important feature in the landscape design is to provide integrity and composition. Therefore, the important point to be considered is that the components and elements of space to be used should be in harmony with each other and should complement each other. The components and elements of the space assume many different roles and are highly effective on the overall effect of the space. Water is one of the most important of these elements, and as it was stated, can assume the edging, orienting, meaningful, focus, and continuality roles. The correct use of water element in designs is ensured by the accurate knowledge about its types and usages. Therefore, how water can be designed depending on the different tasks assumed by it has been expressed by scenarios in this study.

In conclusion, the reasons for the use of water elements, their usage forms in the landscape, their environmental impact and different usage forms were investigated in this study. These investigations and classifications suggested in the study, and the design scenarios generated depending on the tasks assumed by the water are expected to contribute to the water element design and applications in the landscape.

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Chapter 26

A New Approach of Landscape Planning for Turkey: Historical Landscape Character Assessment

Sara DEMİR*

INTRODUCTION

Landscapes are typically taken as ecological units that are tightly related to many processes and components, and are, in fact, the products of long-term interaction of natural, biotic, abiotic and anthropogenic processes. Furthermore, rapid growth of population, technological progress, industrialization, unconscious and unplanned consumption of natural and cultural resource values, and climate change are disasters that might lead to the deterioration of natural balance of landscapes, destruction of cultural values, and consequently, the change of landscapes over time. The realization of these changes in international scale brought the European Landscape Convention (ELC), which includes the determination, protection, management and planning of all landscapes, on the agenda. The determination of landscapes is necessary for their assessment, protection, management, and planning. Approaches requiring the production and obligation of maps regarding landscape classification, which address historical, natural and cultural processes to be carried out at international level, are important tools in this regard (Eetvelde & Antrop,M.,2009; Müncher & Washer, 2007).

Historical Landscape Character Assessment (HLCA) gives information about the historical character and historical development of each specific landscape character type with the particular references over time. In addition, HLCA determines the historic character of landscapes and also uses archaeological perspective of historical character type to help landscape planning decisions for the future (Turner, 2006; Turner & Crow, 2010). This HLC approach started in England and has been developed rapidly in other countries in Europe depending on ELC accepted in 2000 by all Europe countries. Thus, preparing HLC map and HLC assessment do not have a long history. Using sources for preparing HLC maps include old paper maps, digital maps, satellite images, and aerial photos and each of them include useful information about the landscape story. They might be used in GIS to combine and compare various data. GIS based techniques are useful for preparing HLC to analyze and compare different years and different scales of past and present landscape data (Kienast, 1993). Furthermore, GIS environment facilitates understanding of all historical landscape character. This fact might, in turn, be a great help to decision makers for evaluating over-time landscape changes and also for estimating future landscape growth according to past and present HLC results (Turner, 2006; Turner & Crow, 2010).

Landscape-related issues are in fact in line with a set of scientific disciplines that are somewhat related to landscape. Accordingly, the best way for understanding,

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managing and planning historical landscape is to form a multidisciplinary committee including landscape architects, planners, sociologist, historians, anthropologist, environmentalist, ecologist and geologist through participatory approach (Turner, 2006; Turner & Crow, 2010). Landscape has a set of individual characters and it is evaluated with its own physical features regardless of history of human inhabitation that, in turn, leads to monolithic and carefully detailed information. It is difficult for landscape planner and landscape archaeologist to assess cultural and natural landscape values together as landscapes are quite complex. Therefore, many important historic landscape details do not receive adequate attention and disappear in landscape assessment maps which, in turn, results to lack of effective protection, planning and management decisions for individual monuments, building and historic environment. Owning to these reasons, landscape archaeologists developed the Historical Landscape Characterisation (HLC) technique in England and Historic Land-Use Assessment (HLA) technique in Scotland (Dixon & Hingley, 2002; Turner, 2006). The England historic environment advisor named English Heritage started to search different methods to understand and assess landscape with the specific reference to historical and archaeological characteristics for interpretation of the landscape story (Turner, 2006).

Historical landscape assessment ensures that local community understands the historical roots of their area and also ensures the increase of their sense of conservation and ownership concerning these areas (Ede & Darlington, 2002; Lambrick & Bramhill, 1999). This assessment contributes to understand how the landscape has taken its current shape according to historical perspective, natural forces, and human intervention. Based on this historical information, it provides the opportunity to make decisions about the development, change, and management in the future (Turner, 2006; UHLC, 2002). The examples of England such as Lancashire, Aylesbury Hampshire and Shropshire about historical landscape assessment studies have powerful application potential for the spatial planning, land management, agriculture-environmental policies, landscape policies, landscape development strategies, sectoral guidelines, and local differences (Shropshire, 2007; Aylesbury, 2005; Ede & Darlington, 2002; Lambrick & Bramhill, 1999).

Historic landscape character contains homesteads and settlements, field boundaries and patterns, building and monuments, planted woodland, cut bogs, roads, quarries, mines and factories which are, in essence, the remains of people on landscape. Historic landscape character determines these remains from the past landscape and also the perception and interpretation of experts and public to understand today's landscape (Lambrick, Hind & Wain, 2013; UHLC, 2002).It detects the contribution of past to the present landscape. Human activities have altered landscapes over thousands of years and because of this fact, the remains of the past landscapes are of great importance role for present landscapes. HLC is not only concerned with specific sites and moments, but it takes account of whole landscapes with contribution of historic character.

It is possible to create more holistic, comprehensive, and understandable landscapes by integrating these two assessment methods with each other. The mosaic structure and time depth of historical characters might be read on the results of the landscape assessment studies (LANDMAP, 2013; UHLC, 2002). Additionally, by including the historical landscape assessment into the "Landscape Assessment" process, the effects of the changes in the past could be analyzed and monitored on the modern environment which, in turn, leads to determining the interaction between natural forces and socio-economic forces (human actions) (Ede & Darlington, 2002; Fairclough, 2014). The results of the historical landscape assessment studies are, then, the basis for the landscape character assessment studies.

Historical Landscape Character Assessment

Time depth studies on different range scale historic landscape maps have recently become popular. In line with this popularity, Historical Landscape Character Assessment (HLCA) map has been prepared using huge and diverse datasets in GIS. These maps are different from traditional and individual archaeological ones, which include list of sites with related information of historical resources (Turner, 2006; Turner & Crow, 2010). HLCA incorporates the change of land use-land cover during the time depth that, in turn, causes the findings of HLCA to provide beneficial tools for scientific research, landscape planning, protection, management and monitoring. However, this type of data is not sufficient for all landscape history as generally the location of the data is limited or does not have adequate records and thus they might not account for all historic environments (Turner & Crow, 2010). Furthermore, the common features presenting their general historic characters such as unconventional buildings, land use boundaries, lanes, and trees do not reflect their real character (Turner & Crow, 2010).

The assessment of historic landscape character is adopted by the principles of rural commission in England. They are related to the landscape definition of European Landscape Convention (ELC) in 2000. According to ELC, landscape is a field consisting of the action and interaction of natural process and/or human factors. In the same year, the principles of HLCA were determined in "European pathways to the cultural to the cultural landscapes" commission.

With reference to the principles of HLCA, it regards today's landscape as a material of culture. Thus, HLCA gives planning, conservation and management decisions for present landscapes which have remained from past landscapes. HLCA focuses on history and not geography of landscape; and it works with area data not point data as the study area of HLCA is the whole landscape not just specific sites of it. It does not have a simple map process that indicates just monuments and buildings distributions. The whole areas and aspects are improved as a part of historic landscape character not just special and specific area. HLCA are shaped by human activities. Semi-natural areas and settlements are parts of historic landscape character. Landscape characterization involves also the interpretation of data not just recording data.

Historic Landscape Character Assessment identifies and describes essential and distinctive landscape patterns, features and qualities using fundamental archaeological and historical methods. Additionally, HLCA is a complementary technique that might link field and archeological data and their historic features. HLCA is tightly pertinent to historical development and the map of historical landscape areas. For preparing HLCA map, landscape patterns which reflect the historical development, and physical features which define the specific types of landscape archeology are needed (Turner & Crow, 2010). For creating HLCA map, GIS provides text and vector features, hence it could help to explain each point, line and polygon layer with their text information. HLCA can be adapted with GIS to apply and suit in the different landscape types with ancient origins according to their features (Turner & Crow, 2010). With GIS technique, HLCA can relate wide landscape patterns in the historic environments through monuments, boundaries, land use type and other specific cultural landscape resources. Thus it can be related land use/land cover changes of landscape patterns.

The material of HLCA are the survey maps including all periods, vertical and oblique aerial photos, existing historic landscape character maps, regional historic environment records, old photos, existing GIS data, archive materials, especially cartographic sources and the information of experts and local people about study area. HLCA is also a key to understand cultural and historical values as historic landscape types (LANDMAP, 2013; Lambrick et al., 2013). In this context, enclosures, rough ground, woodland, industrial, military, miscellaneous settlement, coastal types are some examples of the type HLCA depending on existing natural and cultural landscape resources (Table 1).

Table 1: Some examples of historic landscape character types and periods (CHL, 2016)

Enclosures	**Industrial Types**
Strip fields	Industrial (mining)
Enclosures (strips)	Industrial complex
Enclosures	Quarry
Watermeadow	
Orchard	**Military**
Horticulture	Military complex
	Airfield
Rough Ground	
Rough ground	**Miscellaneous settlements-related types**
Outcrop, scree, cliffs	Park-garden
	Public civil complex
Woodland	Recreation
Ancient woodland	Settlements
Conifer plantation	
Other woodland	**Coastal Types**
	Dunes
Water	Mud
Marsh	Sand
Water	Mud and sand
HLCA Periods	
Prehistoric	Medieval
Post-medieval	Modern

Moreover, HLCA is used to determine the area of the historic landscape aspects in four different levels from big to small scale ranges as first, second, third and fourth level. Regional level is potentially useful for classification but the first and second type level classifications do not have sufficient details about local landscape. Therefore, the third and fourth classification levels are necessary for further details. Specifically, it is possible to realize particular local situation in the forth level classification. For example, the mapping of infrastructure elements, industrial complex or settlements in the fourth level is better than the third level classification.

HLCA presents today are cultural landscape that is shaped by people and over time. According to last HLCA studies in England, it has been demonstrated that much of landscape forms are the remains of human impacts in the past and present (Turner, 2007). The principles of HLCA as a process are (Lambrick et al., 2013; UHLC, 2002);

- Present not past: it involves the time depth of existing landscape.
- Landscape not sides: it considers the whole landscape not just significant and particular monuments or sites
- Cultural Landscape: human activities affecting natural landscape values.
- People's views: the perspective and perception of public and experts.
- Landscape change: HLCA aims to just detect and inform the landscape change not prevent it.
- Transparency and accessibility: the process is remarkably clear and it is easy to be used by others.
- Inter-discipline: It is a useful tool for integration with other process and records.

METHODOLOGY

The technique of HLCA is simple and flexible to be used at a large scale and broad landscape pattern to determine unique differences. Moreover, it needs desk-based study with little fieldwork. HLCA needs to record historic land-use, however, it is not only data collection. Interpretation is also a significant part of HLCA approach. This method ensures a quick overview before starting detailed analysis of research or project. HLCA usually studies large administrative areas such as countries, watershed and National Parks. HLCA map indicates field boundaries, land parcels and buildings by using digital maps, modern ordnance survey on 1:10,000 or 25,000 scales. Standard geographical base map is used for HLCA supported by vertical aerial photographs, digital habitat and woodland data and other historic maps. HLCA is interested in the survivor part of present landscape, instead of focusing on reconstructing or recording past landscapes during the historic depth. To put it another way, it emphasizes the landscape part that survives from past to today's landscape. All modern landscape maps and air photos are also used to produce historic character based on a range of types. In general, the visible symbols that allow a feature of an area over one or more types are chosen and recorded for most comprehensively assessed historic character of the area. These kind of visible symbols include straight or curved field boundaries, size of fields, the traces of remains of boundaries, morphological signs of enclosed of enclosed strip fields (Figure 1).

The data can record earlier form of landscape character which, in turn, makes it easy to study and forecast the changes of landscape through time. HLCA method prioritizes mapping the size and distribution of the endangered landscapes. All attributes are recorded as polygon forms in a GIS. The size of polygons is determined by landscape scale as historic landscape character is usually represented for groups of land parcel not for each land parcel or field. Thus, the resolution of map demonstrates the own character of landscape such as sub-divided tableland or steppe, existing or missing visible medieval or prehistoric remains. GIS polygons are large in areas which have large homogeny but small in areas which have great diversity (LANDMAP, 2013; LUC, 2016). GIS also provides a very wide range of maps, analysis, and thematic synthesis. Consequently, the outputs are not limited by area-based map. Generally, the main public image that support HLCA map and the outputs of HLCA are suitable for inputs of LCA in GIS (Kienast, 1993; Lambrick et al., 2013; UHLC, 2002).

Archeological area and sites are not reflected by point data and it makes HLCA different from other approaches that are concerned with archeological landscapes. The aim of HLCA is not to represent the landscape components; on the contrary, it maps local depiction of all historic landscape characters. This fact links landscape character assessment and landscape areas features as HLCA has a common language and has a methodology adapted from landscape character assessment. A landscape management, development control, educational or research tool as part of HLCA's evolution and updating are used for post character analysis of HLCA project.

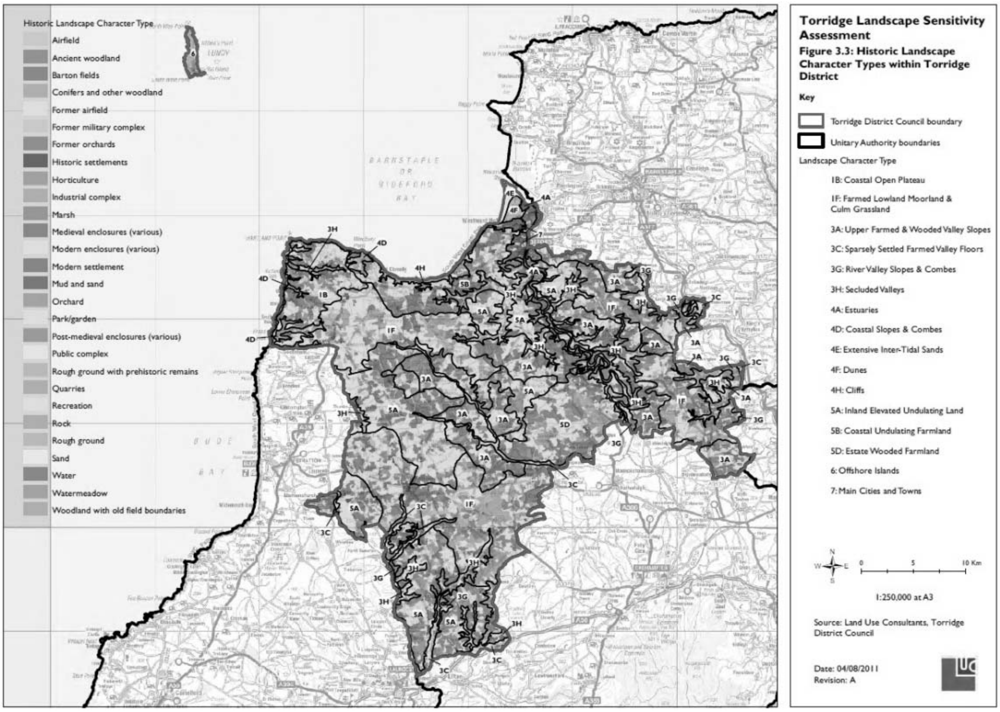

Figure 1: Torridge Historic Landscape Character Types (LUC, 2011).

The distinctive contributions of HLCA provides assessment and understanding of historic landscapes which are relevant to the time depth of landscape, evaluation of the whole modern landscape and its historic character, definition and sampling landscape character in historic time terms, determination of the historic importance and landscape pattern of major land use such us, woodland, tableland, enclosed field, description of previous episodes of landscape through time-depth definition, measuring recent landscape character change through digital map and determination the change and alteration of historic landscape character.

Application of Historic Landscape Character Assessment

Historic landscape Character Assessment is a tool to understand the character and development of modern landscape such as LCA. It aims to affect future development and management decisions. It also has potential application areas in spatial planning, field management, agri-environmental policy, landscape policy, local differences and community-based initiatives, education and communication (Dobson & Selman, 2012; Herring; 2009). Every part of the landscape has some historical character types which would be influenced positively or negatively by landscape changes. Furthermore, it is a tool for providing information in the decision-making process. The findings of this process are not indicator of absolute value. The process indicates the adapted landscape character that might absorb the changes that causing threat and opportunities effects on landscape. The traditional conservation approach such as scheduling of archeological sites or declaration of national park is highly important for heritage protection. However, HLCA has the most sensitive and significant features for local character in local contexts. This approach can be applied for newer sustainable based research and project. HLCA is relevant to spatial planning, landscape planning, and development control and policy issues. It aims to understand the landscape by planners as it focuses land use decisions, monuments records and inform the individual feature of site (Dobson & Selman, 2012; Herring; 2009). HLCA determines historical character of landscape and uses similar way of LCA as a material (Turner & Crow, 2010).

HLCA plays a significant role in landscape planning and management. It provides national and regional overview to determine local historic character from national to local level scale. HLCA also defines cultural sites and historic landscape character and could be combined with LCA to determine landscape character for planning, management, protection whole urban and rural landscape and monitoring the landscape change. In a similar way, HLCA is also a useful tool for local people to understand the historic root of their landscapes and increase the feeling relevant with landscape character area (Lambrick et al., 2013; UHLC, 2002). It defines the specific features of landscape character to find out the differences of landscape improvement and to highlight the local differences and diversities which associated with human uses and activities in the landscape. It helps to link survival and visibility physical remains and landscape uses in the past. Likewise, it aims to understand the landscapes and land uses changed by people. HLCA usually works in GIS and because of that it can be easily related to data of rural and urban archeological areas (Kienast, 1993; Turner, 2007; Dobson & Selman, 2012). These data could be analyzed in different ways and compared with the different data sets (woodland, settlement types, traditional buildings or field boundaries). In addition, it ensures opportunities for many analyses relevant with environment records such as the relation among land use change, population, historic development and biodiversity. HLCA is powerful, flexible and simple tool.

Contribution of Historical Landscape Character Assessment

Historic Landscape Character Assessment is a method to determine the historic character of specific places and different landscapes (rural, urban or marine). It is, in fact, a tool that might enhance the understanding of past human activities leading to changes in the present landscape. It could also demonstrate which landscape character needs to be taken into account to decrease landscape changes (Lambrick et al., 2013; UHLC, 2002). HLCA also provides opportunities for historical and archeological research and public understanding. Landscape is considered and assessed as a whole by people; therefore, public participation is essential and significant for the success of HLCA process. Moreover, HLCA can enhance people's welfare and their life quality by promoting awareness of local environment and by providing sustainable land use decisions. It develops the historic qualities in the natural and cultural landscape at national, regional or local level. The contributions of HLCA on landscape are as follows (Turner, 2007; Turner & Crow, 2010; Lambrick et al., 2013; UHLC, 2002);

- It plays as a key role to LCA at regional and local level according to ELC

- It develops public awareness and understanding of historic landscape as a key role of people's sense of place and identification.
- It could set essential basis guidance for regional and local development plans and their strategic environmental assessments with the heritage issues.
- It provides essential basis for assessing interaction of heritages, wildlife, endemic plan and other natural and cultural landscape values in environmental impacts assessments process.
- It significantly contributes to regenerate local and small town and villages with the preparation Village Design Statements.
- It aims to provide landscape management, create agricultural-environment program, regenerate rural areas, diversify farm and expand woodland areas.
- It helps to develop design guidelines for settlements and traditional rural housing, wind farms, major and green infrastructure
- It produces outputs for heritage strategies, local action plans and tourism strategies.
- It produces outputs for integrated coastal zone management
- It informs national heritage sites, architectural protection area and natural protection
- It provides effective tool for further research and project at the local, regional and national level in historic environment.
- It ensures efficient ways to link economic/functional and social/symbolic landscape character types.

HISTORIC LANDSCAPE CHARACTER ASSESSMENT FOR LANDSCAPE PLANNING

Planning ensures opportunities for social, environmental and economic development, and also effective usage of landscape values. Landscape planning aims to protect the natural, cultural and historical landscape resources and to provide usage balance (Uzun, 2015). Additionally, landscape planning, management, and protection have become current issues within European Landscape Convention. This convention has promoted landscape planning, protection, restoration, monitoring, management, and co-operation on landscape issues among the European countries. According to this convention, each European country should promote to determine the entire landscape, identify the distinctive landscape characters, and define the pressures on the landscape values that might lead to landscape changes. In addition, these countries should integrate their findings with their legal and regulatory processes. In a similar vein, landscape planning and management which includes different ecosystem and land uses need interdisciplinary committee (Uzun, 2015; Dobson & Selman, 2012). According to ELC, landscape values might be improved and protected by defining historic landscape and landscape character of landscape areas in the landscape planning process. During this process, the ecological features should be determined, the land usage should be evaluated and the landscape which is affected by human activities should be detected and protected. Thus, it could be assessed that the findings of HLCA and LCA might significantly support the landscape planning process.

Historic Landscape Character Assessment is, in fact, an efficient way to explain historical character of landscape compared to other archeological techniques. HLCA presents historical values of landscape in the wide scale from particular periods. HLCA approach has two key principles; first, landscape is evaluated based on perception; second, landscapes change over time (Antrop, 2005; Turner, 2006; Turner & Crow, 2010). HLCA can also link past and present and evaluate the changes from past to present. Consequently, it can help to produce data for future landscape planning and gives some information about landscape changes. Some landscapes change faster than others and therefore HLCA map indicates which landscape types can absorb more changes and in what spots have faster changes on historic character types (Dobson &Selman, 2012; Turner, 2006).

Furthermore, HLCA type styles can cause debates and discussions on the future landscapes from many different perspectives through different disciplines. Some analyses in HLCA can also set guidance for sustainable development, landscape planning, restoration and enhancement to preserve the national, cultural and historical landscape values with collaboration of landscape disciplines for future studies (Herring, 2009; Turner, 2006; Turner & Crow, 2010). In addition, it plays a role in helping people to realize the historicity of the landscapes and to recognize story and be informed new ideas about their landscapes (Turner, 2006). HLCA might also help to understand the real value of each historic character type and enable more balanced, wide-ranging and democratic debates in landscape discipline.

Finally, HLCA findings might be used for historic environment resources as evidence and creates database for other sources. It complements and contributes to LCA through adding historic perception to the landscape. HLCA determines and analyzes historical characters and detects sensitivity, significance and change pressure (Lambrick et al., 2013; UHLC, 2002). This assessment plays an essential role for future landscape planning and management.

The Relationship of Historical Landscape Character Assessment and Landscape Character assessment for Landscape Planning Approach

The inventory of different and perceptible landscape patterns should be analyzed and should be classified in order to have sustainable use of natural and cultural landscape values. Thus, it helps keep them for the future generations with sustainable development. (Bastian, 2000; Şahin, Perçin, Kurum, Uzun & Bilgili, 2013; Washer, 2005;). The context of ELC, the studies of landscape character assessment in which the natural and cultural landscape values are defined and might create conservation, planning and management decisions according to its own features and character, have recently gained importance. These studies have been completed in almost all the Europe and these methods continue to be followed to determine the landscape types of all countries and the landscape variables were explained for making efficient landscape planning decisions (Atik, 2010; Mücher, Klijn,Wascher, & Schaminee, 2010; Uzun & Yılmaz; 2007; Washer, Perez & Müncher, 2006).

Landscape character assessment is also used for the purpose of supporting sustainable development and it is included in the decision-making process (Swancwick, 2002; Müncher & Washer; 2007). In this context, the holistic assessment of data was done in accordance with ELC in other planning processes and the integration of them into the legal legislations processes was highly important in terms of planning and protection of the landscapes (Swancwick, 2002; Washer et al., 2006). Thus, administrative approaches might be developed in the resource protection (Ahern, 2006).

Historical Landscape Character Assessment is integral to Landscape Character

Assessment as it uses LCA type approach. Nevertheless, it is usually a long term process largely due to studying different range scales and different skills requirement. This fact leads to differences between HLCA and LCA as HLCA has wider range uses in landscape planning and management through supported by historic environment approach, not just at landscape scale. It is important, however, that the integration between HLCA and LCA can produce a more holistic, comprehensive, clear and sufficient landscape approach. The ideal and effective way is that HLCA be produced first and then the results and findings be used to start and inform LCA. Besides, if necessary, HLCA outputs might be used for improvement and deepening of existing LCA results.

Additionally, HLCA involves the landscape types which have historical importance and is shaped in the long-term by human activities and long natural processes. Furthermore, the addition of HLCA to LCA process and assessment together can determine how past changes affect modern landscapes and how they might lead to the complex interaction between human activities and the existing LCA natural forces through time depth. HLCA produces information and findings to LCA for deeper understanding by using the time schedule of the landscape from past to modern landscape. HLCA enables us to understand better conditional for present landscape by taking into account past activities in LCA. This historical perspective helps us to understand how natural forces and human intervention have affected the formation of present landscape over time. Many successive phases give useful information about the landscape development of character types. According to historical content and ideas, it can be used to make decisions about the future changes.

HLCA has character type-based methods and outputs. It works as type level and does not determine its own historic character areas with confusion. LCA has character type as well as character area methods and outputs. The scale of HLCA is finer than LCA. Moreover, HLCA has more details than LCA. The historic character type of HLCA suits with LCA character area. The detailed information about historical root and time depth of HLCA explaining the landscape can add to existing landscape character areas. In this way, it can be read on the landscape character area the HLCA mosaic and time depth.

Integration between HLCA and LCA requires collaboration between landscape experts and researchers and archeologist who produce and use HLCA. HLCA prepares maps with similar techniques such as Landscape Character Assessment. The spatial data of HLCA are recorded and stored in GIS environment. These stored data are available for use in LCA and both databases can be analyzed in GIS

LCA is about today's natural and cultural landscape values otherwise HLCA indicates natural, cultural, archeological values and historic environment with human action which shaped landscape from past to present (Kienast, 1993) Therefore, the combination of the HLCA data with other data such as geology, geomorphology, soil, land use would be easier. The integration of GIS including LCA and HLCA data might leads to understanding and managing landscape changes.

It is, then, strongly recommended that HLCA be completed before LCA process. It would be useful and efficient way to give suitable advises for the LCA guides of landscape planning, management, protection and monitoring. For complete integration, LCA is informed from HLCA in terms of drawing the boundaries of character areas and determining the landscape character. Early integration is a significant phase for determination of the forces leading to landscape changes and for determination of landscape management policy.

DISCUSSION and CONCLUSION

As defined in the European Landscape Convention (2000), the concept of ‘landscape’ provides a way to bring cultural and natural heritage together in mutually-supportive ways. Landscape offers a global frame to address social and environmental challenges and to exploit the social, economic and environmental values of different types of heritage for social benefit. Landscape perspectives can be local and universal, personal and collective; they embrace both tangible and intangible heritage and have strong cross-sectoral connections to areas (CHL, 2016; Herring, 2009). Landscape is as a ‘powerful, diverse and dynamic cultural resource for people in Europe’ with the ability to transform people’s daily lives by facilitating social and economic benefits for all people in society. The social and economic potential of landscape as cultural heritage and the implementation of the European conventions are currently inhibited by scientists’ failure to address two major challenges (CHL, 2016):

- To identify and implement effective methods for advocating positive change based on a well-understood and clearly presented base of evidence
- To create effective relationships between landscape research in different scientific disciplines, landscape planning policy and practical implementation in landscape management

HLCA will address these two fundamental challenges in Turkey. In particular, it will promote research using interdisciplinary characterisation and assessment techniques to inform positive landscape planning and management. The HLCA will identify challenges to implementing it in Turkey and the steps required to integrate ‘historic/cultural’, ‘natural’ and ‘visual’ aspects of landscape.

Different landscape classification projects have been carried out in order to determine and introduce landscapes at international level and the outputs obtained have been integrated into planning processes (Jones et al., 1997; Şahin & Bekişoğlu, 2007; Uzun, İlke, Çetinkaya & Açıksöz, 2011). Hence, research and projects that ensure the protection and development of landscapes and are assessed with their historical past and can constitute a legal basis for plan and project decisions will be carried out. Nevertheless, the inventory and analysis studies of the resource values that are necessary for the determination and understanding of country landscapes that are promised by Turkey within the scope of ELC are at the initial stage and have not yet taken their place among legal processes. Additionally, the assessments that follow the historical development of the landscapes that are at the initial stage around the world have not yet been implemented. Thus, non-holistic protection and sectoral based plans and projects that do not have landscape awareness and assessment process based on landscape damage the landscape with an important source of value and irreversible resource losses (Atik; 2010; Şahin et al., 2013; Uzun, 2003). Thus, it is important to prevent these negativities in Turkey.

The outputs of HLCA integrated with LCA will contribute to development of plans, the environmental plan, long-term development plan, planning strategy, and provides a reference for Environmental Impact Assessment (EIA), environmental management. The present study showed that it can be integrated into all planning processes as a result of landscape values including natural, cultural and historical traces will guide many professional disciplines such as landscape architects, urban and regional planners, architects and archaeologists. In addition, this study aimed to increase awareness of the local people regarding the landscapes they live in and develop landscape planning and management strategies. It is, then, expected that the socio-economic welfare in the research area gradually increases. It is, then, necessary to complete national level of HLCA for determining landscape changes. LCA is great guide to complete the objectives of ELC, which highlights a holistic approach with natural and cultural landscape diversities for landscape research and studies. The ELC and other European enterprises may provide international approach for development HLCA in Europe.

This paper, by providing a dynamic, flexible, and holistic planning approach that investigates landscapes as a whole with their natural, cultural and historical properties that take the changes in the landscape into consideration, will create foresights regarding future protection, planning, development and management policies. The results of this paper that emphasizes the effect of historical landscape values on today's landscapes and can create a concrete relationship will provide information regarding more conscious and sustainable planning approaches and development policies especially to decision makers on the planning-related decisions that are to be taken. Turkey has many national, international and historical remains and historic landscape values, which are under threat due to lack of administrative structure, lack of landscape planning and management plan. This paper, which addresses historical character landscape assessment and fulfils the necessity of ELC, might also provide necessary information for other researches in Turkey to conduct further studies on the same issue.

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Chapter 27

The Significance of Ecological Approaches in Local Governance Systems

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INTRODUCTION

Cities as habitats are human ecosystems in which many natural and cultural qualities interact with each other. In cities, interwined socio-economic activities such as transportation, trade, industry, and tourism take place for economic development. If we consider the city as a living ecosystem, the progression of this system is only possible, through maintaining its cultural and natural assets within a certain balance.

Rapid urbanization processes in the world has rised concerns about "environmental carrying capacity "of the urban areas and "habitability of the city" concepts and hence interdisciplinary research on this subject has begun to increase.

Concentration on urban areas and urban growth has brought up many problems. Cities growing and changing over time have caused threatening effects on the ecological balance and life. The environmental and social problems created by modern city life, therefore led to the development of new approaches on urban planning in order to ensure a healthier urban development.

The current agenda in today's urban planning literature takes the principles of urban ecology into account. Discussions focus on the development and management of the city according to health issues, natural and ecological principals.

Many authorities have responsibilities for sustaining healthy social and physical urban development. The mission and responsibilities of central and local government institutions are determined by laws and regulations. These institutions are making attempts for the development of liveable spaces with applications in different fields. However, threats such as the rapid development of cities, densed urbanization and annuity-based development trends causes contradictory results of development with the ecological sustainability goals. To be more effective in urban management about ecological approaches, to raise awareness in this issue and to lead the public to take the necessary measures, it is necessary to make changes in governance of cities.

In the scope of the study, the role of local governments to achieve the goal of ecological sustainability in urban areas will be examined. Examples of the local government implementations based on the ecological approaches will be discussed and relatively suggestions will be presented in the scope of ecological local governance.

The researches within the scope of the study are supported by the related literature and web based data regarding issues of local governance, urban ecology, environmental

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and urban relations. The hypothesis of the study is that the increasing environmental problems in cities can only be solved by a holistic ecological local governance approach, and the activities in this regard should be increased locally. Accordingly, this research has emphasizes and evaluates different perspectives of ecological approaches to local governance.

1. URBAN ENVIRONMENTAL PROBLEMS AND CAUSES

There are many reasons for the unhealthy growth of the cities in physical and environmental aspects. Altough, environmental problems may be limited to the pollution of the air and water, in broader terms the main factors causing environmental problems are irregular urbanization and urban governance problems. Also, the inability to organize the production relations in cities, social and social problems, political ground dominated by market forces, and the growing surplus economy with rural-urban migration are considered among other important reasons (Torunoğlu, 2015). Industrialization and unawareness of resource use due to industrialization and the uncontrolled urbanization have affected most of the cities in the world. Accordingly, the environmental problems that occur in urban areas are;

- Pollution
- Irregular urbanization
- Unplanned industrialization
- Excessive energy consumption
- Problems concerning recycling
- Increasing waste and waste management problems
- Soil losses caused by unconscious land use
- Exhausted and decreased natural resources
- Decrease in urban green areas
- Negative microclimate caused by the reduction of green areas (Özcan, 2007).

2. ECOLOGICAL APPROACHES IN LOCAL GOVERNANCE

Ecological approach emphasizes sustainability in terms of ecology in concept of sustainable development. Sustainability in terms of ecology may be possible through the effective and economic use of scarce resources. In this regard, protection of the physical components of an ecosystem and long periodicity of the system resources from the deterioration depend on the efficient use of environmental systems (Özcan, 2007).

In ecological aspect, cities constitute an environmental system with living and non-living elements in a certain area. Eliminating the problems that arise in this area and achieving the targeted sustainability at the macro scale surely depend on the realization of urban developments according to the ecological scientific principles. In this regard, ensuring sustainability in urban areas can be possible through preserving resources and improving the health of the ecosystem on one hand, and implementing a change process in which the supportive measures for economic development are taken on the other hand (Ertürk, 1994 transmitting: Özcan, 2007). This process of change is based on adoption of appropriate goals and objectives in compliance with the ecological principles and implementation of policies in urban management.

It is necessary to know the basic characteristics of the ecological approach to adopt and implement an ecological approach in an urban management approach. The principal features of ecological approach in this context can be expressed as follows.

- Ecological approach covers the whole system, not only parts,
- It focuses on the domestic relationships between factors,
- Relations between the components (such as air, water, soil, living organisms) of the ecosystem are important,
- It accepts dynamic structure and nature of ecosystem,
- It includes concepts of carrying capacity, flexibility and sustainability suggesting the limitations for human action,
- It uses a wide definition of the environment (such as natural, physical, economic, social and cultural environments),
- It is based on natural geographical units rather than administrative boundaries (such as watersheds),
- It covers all levels of local, regional, national and international works,
- It emphasizes the importance of species other than people and (future) generations other than existing ones,
- It is based on an "ethic" measured by quality, prosperity, integrity and humanity in the process, which is compatible with natural, social and economic systems (Koç, 1994, p. 145).

It is important that ecologial concerns should imply spatial, social and economic aspects of the urban development. Spatial aspects are part of the urban planning process.

In the aspect of urban planning, the approaches that examine the relationship between urban development and the environment; environmental protection concept, the relationship between the environment and urban growth, the proper use of resources, etc. qualifications have priority. If environmentally friendly urban development is intended then urban areas should be planned from the ecological planning perspective.

Ecological local governance has many environmental benefits. Urban systems that develeop with ecological approaches can be effective in solving many urban problems. For example; using rainwater runoff in the design of wetlands can be used for the natural hydrological cycle. It can also contribute to the improvement of environmental air-conditioning and air quality within the created natural environment in urban areas. Planting as a natural structure supported with local species may also be an effective tool in ensuring urban volume control (Tregay, 1986).

Ecological local governance also has benefits in the means of sustainable development. By providing electricity from renewable sources such as sun, wind or water power fully in line with the potential of the field, besides reducing the consumption of natural resources, the goal of creating sustainable urban model for new implementations can be ensured (Birkeland, 2002)

In order to minimize waste output in urban areas and provide materials for new implementations, recycling activities constitute the starting point of local governance policies at each stage. Therefore, besides using the present materials in the field by new regulations, recycling of organic wastes for use in planting and collecting other wastes for recycling are possible (Stitt, 1999; Cranz and Boland, 2003). These implementations will not only be a part of urban recycling policies, but also by raising the awareness of local users there will be contribution to the success of recycling policy based on cities.

The ecological approaches in the design of of green areas as the main pricipal of design play an active role in preserving the city's historical and cultural texture

(McHarg, 1969).

Another benefit of the ecological governance is about efficient land use. The idle areas in the city can be tranformed to efficient green areas with the ecological approach in an easy and inexpensive way (Trus of Ecology, 2009). In this way, it is encouraged to increase urban green land use by providing recreational and also educational uses to the idle spaces (Emery, 1986; transmitting; Ruff, 1987).

Upgrading the quality of life in their region, urban natural areas will trigger the desire of the people to live there and besides the increase in property prices in the area; they may facilitate other small-scale economic activities (Emery, 1986).

All these approaches affect the quality of life in urban areas in a positive sense and they yield rises in life quality standards. The main objective in ecological approach is to improve physical quality (air, water, air conditioning, visual, etc.) in the urban areas. Furthermore, on condition that the natural areas are protected and the density of land uses are kept low, opportunities for different natural, recreation and sporting activities can be created. In this way, besides the benefits of the physically and psychologically healthy society, it is considered that the protection of the natural environment of the area will contribute to the understanding of natural aesthetics.

Table 1 shows the list of fields to be considered in the ecological governance of cities under main headings.

Table 1. Fields to be considered in the Ecological Governance of Cities

Urban technical infrastructure, • Water management • Treatment of wastewater, • Sewage system, • Rainwater drainage, • Solid waste management
Management and practices of natural areas
Training projects
Spatial designs and implementations
Urban social and economic projects and implementations.

This paper aims to discuss implemented projects regarding local governance with an ecological approach below.

2.1 Solid waste management

Solid waste management concept can be described as control of the amount of waste, collection, deposition, transport-transfer, processing and disposal discipline taking into account the the production and consumption habits of society, human and environmental health, economy, engineering, resource conservation, aesthetic and other environmental issues(Tchobanoglous other. 1977, p. 15).

Solid waste that is produced in the cities must be managed to increase the urban life quality. This activity began in the form of waste disposal in the past, but recently, with the development of technology and economic opportunities solid waste is being managed in the form of both energy recovery and material recovery. In this context, the concept of solid waste management has become one of the main necessities of sustainable urban environments.

For an applicable and efficient waste management system; determination of the authorized / responsible person, identification of the waste, separate collection at source, staff training, the establishment of temporary waste storage site, pre-treatment, disposal of waste / sending to recycling, keeping records, and implementation of the steps are necessary (Ministry of Education, Environmental Health, 2011).

When we look from the perspective of ecological approach, sustainable waste management is an important part of sustainable development desired to be carried out with its environmental, economic and social aspects. Waste has two important implications in terms of sustainability. Firstly, arising wastes are indicators of how effective or efficient the sources are used; secondly the waste must be disposed economically and sensitively regarding environment. The first rule of waste management is the minimizatiobn of the wastes and protection of sources. Waste is not a substance which is necessary to be destroyed, rather it is seen as a source to be recycled.

The concept of sustainable waste management focuses on the management of waste produced by different sectors in social life, minimisation and inhibition of lost waste in storage area and in incineration plants, the attainment of high recycling rate, replacement of materials whose recycling and reuse are not possible with those which can be recycled and reused (Palabıyık and Altunbaş, 2004, p. 11). Also, there are needs for;

- Decreasing the amount of products containing more waste, and selection of products containing of minimum waste
- Selection of producers who support using products containing minium waste and non-essential use and who insist on re-use,
- Reuse of the product, where appropriate,
- Promotion of the principles of waste minimization in homes by authorities,
- Cooperation between the government and other local authorities for giving realistic environmental briefings about products and their uses,
- Allowance of opportunities for recycling or reuse by local authorities (Günbeyaz, 2007).

2.2 Waste water management

City sewage systems besides domestic waste collect discharged waste water from disorganized or organized industrial zone and sometimes also collect rainwater when it is not collected separately. Waste water must go through treatment before it is given to receiving environment.

In this context, to minimize the negative environmental impacts of waste water output on the quality of freshwater sources and in order to protect the flora and fauna,

- Making joint efforts with other companies to enable the creation of managements processes, where there are no waste water facilities,
- Forming pools in order to avoid release of chemicals containing potentially dangerous substances to the streams capture.
- Development of programs that imply officials, tourists and society to prevent water-based pollution, and creation of emergency program to protect water environment from disasters,
- Avoiding potentially hazardous substances that contact with the water systems,
- Preventing damages of water waste by authorities. (Günbeyaz, 2007).

3. ECOLOGICAL APPROACHES IN LOCAL GOVERNANCE - SAMPLES

3.1 Waste management practices

Waste management project based on ecology – Zurich

Ecological Waste Management Project which was one of the pollution preventing practices in local government scale was selected for the 'Wholistic / Preventive Environmental Management Project for Local Authorities - Implementation Phase' by the Chamber of Environmental Engineers.

Zurich applied the combustion technology for wastes for many years but in the recent years, with the increase of problems associated with this method it has changed these policies since 1990 and began to implement ecology-based waste management project. With this new approach wastes are not only used for incineration, but also recycling is supported. The prices for trash going to the incinerators are increased and composting plants are being built for recycled waste.

At the end of the project;

- There was a 25% decrease in the capacity of the incinerators within 5 years.
- Recycling amount increased by 10% and the aim is to increase this percentage to 40% within 2 years (Yıldız, Arıkan, Uğurlu and Demirer, 2003, p.69).

Waste tracking project - United Kingdom

Waste Control is a British environmental charity aiming to change the way people around the world use natural sources. Under the project the world has been imagined where people use resources efficiently, live sustainably and make a positive contribution to the environment. In the project, people are advised to reduce environmental impact by making changes in public life and to improve their quality of life, also they are trained and supported.

The aim is to spread sustainable source use to all areas of life beyond the extraction of source, production, consumption and recycling. They act on their behalf or on behalf of clients.

Goals of the project

- Being an inspiration for citizens, corporate decision-makers, politicians, to adopt needed changes for their manner of life, value and priorities,
- Making source efficiency and effectiveness equated to sound business practices,
- Encouraging sustainable consumption, waste management and production,
- Conducting programs to provide social, economic and environmental benefits,
- Conducting the programs to show that more efficient use of sources is beneficial to environment, business world and the general public.

Project activities

- To get involved in the civil society to create change in behaviours,
- To research people's attitudes and behaviours,
- To communicate on environmental issues with partners, employees and customers,
- To observe, evaluate and supervise the practices and policies in the area of environment,
- To provide its members with regular professional development in terms of environmental issues
- To manage the Education Network,

- To organize events and information stands, presentations, seminars and workshops,
- To organize campaigns on their behalf and on behalf of third parties,
- To learn about environmental issues and perform regular seminars for anyone who wants to communicate with others.

Project results

- Within the scope of the project, it is stated that the largest local recycling campaign is carried out in United Kingdom. For campaigns, approximately 1.5 million interviews were made with households, more than 150 waste prevention campaigns were conducted with local authorities for recycling,
- In 1980s, the first National Recycling Information directive was published, telephone information service, wasteline was created, interactive robot (Recycler) was created in order to give the message of 'reduce, reuse, recycle' in the United Kingdom for elementary school students, the first 'BK Recycled Products Guide was created,
- For the creation of the UK's first waste strategy, lobbying was conducted, "Rethink Rubbish" campaign, which helped recycling to be a commercial activity, helped the creating of WRAP(Worldwide Responsible Accretide Production) in 1990s, later turned into a public awareness campaign 'Recycle Now' campaign, was carried out (Ending waste, 2015).

3.2 Management of Natural areas and Practices

Environmentally friendly technologies project for rural development (Peloponnese-Greece)

It is considered that the basin where Evrotas River's water is collected is a "less prefered" region because of the danger of population decline and the mountainous terrain. It is indicated that excessive use of river water sometimes causes river to dry completely and causes devastating effects on fish populations. The area is exposed to point-source or non point-source pollutions at high levels at the same time but especially suffers from agricultural sources as the use of pesticides and wastes from olive oil and orange juice sectors. Olive mills produce approximately 60,000 m3 of waste water, 57,000 tonnes of wet waste and 6,300 tons of phenolic compounds every year. Until this project, any research has not been performed for river basin district to allow the creation of a management plan.

Under the Project, Integrated Watershed Management Plan for Eurotas River was prepared. The goal of the project was indicated as creating an integrated management plan for coastal areas and Evrotas River Basin by combining socio-economic factors with environmentally friendly technology.

EnviFriendly project plans to create a "tool kit" that can be used to minimize widespread pollution caused by agricultural land consisting of environmentally friendly technologies and the waste water from the production of olive oil and orange juice and the implementation a testing of three prototype units for the treatment of solid waste.

Among jointly and complementary activities to determine the amount of the pollution load in the basin, in order to take control of river bank erosion and anticipate changes, development models of hydrological and geo-chemical analyses are implemented. The project also aimed a reduction of 60-80% in the amount of nitrate in drainage channel of leading to the subterranean waters from Evrotas River basin.

EnviFriendly project has established monitoring stations in order to control hydrological and physical and chemical parameters in the river basin.

- A risk assessment of environmental pressure and sample scenarios was carried out. It is seen that the river basin has a natural ability to decrease the density of the impurity, and with residue and reeds, a systematic sampling from the underground and surface waters, and recording was performed. Prototype units were tested to purify waste from olive oil factories in the area and the waste water from companies producing table olives. Socio-economic considerations are evaluated with polls and meetings with the participation of local stakeholders. (Good practice samples in the environmental field in the European Union, 2010).

The results within the scope of the project

According to the obtained results, with the proper management of the reeds, the 77% of nitrate nitrogen and all the phosphorus that draw into the draining channels, can be eliminated as a result of the absorption of plants,

- The amount of nitrate has reduced 80% in the waste water due to the herbal reclamation,
- It reduces electrolysis BOD content up to %50, which is performed for purification of waste water,
- Natural ability to increase the intensity of the river basin pollution is stated to increase the amounts of nitrogen and phosphorus, respectively, 96% and 98%. (Good practice samples in the environmental field in the European Union, 2010).

3.3 Environmental management project for Local Land Use Planning (Austria – Lake Konstanz)

The aims of the project

ECO-LUP, the four municipalities in the region Lake Konstanz (Konstanz, Uberlingen, and Wolfurt Dornbirn) aim to implement an environmental management system.

Expectations from the project is the improvement of environmental quality standards of the municipalities regarding planning and development in the following ways.

- Increase in reformed natural areas of each municipality;
- The sustainable development of green urban areas,
- Increased use of energy that can be reproduced,
- The conservation of natural habitats and creation of a network in the regions belonging to municipalities,
- The prevention of flooding.

Activities within the scope of the project

The project consisted a detailed analysis regarding strengths and weaknesses, opportunities and threats (SWOT) through a series of local and regional workshops, for each municipality,. Workshops are based on consensus and all relevant operation areas belonging to municipalities (and regional). Local Agenda 21 initiatives has been closely connected with these activities.

Finally, ECO-LUP has taken on the task of certification of the developments of muncipalities according to European environmental management standards (EMAS II). A Handbook on “environmental management and development planning of municipalities” and a supporting software development were carried out for the municipalities in Europe. The results transferred across Europe will be supported by national and international organizations. A final evaluation report of the project will document all environmental, economic and social impacts of the project.

The results obtained from the project

As a part of ECOLUP LIFE Project, EMAS system has been implemented for urban public land use planning processes for the first time.

(Good practice examples in the environmental field in the European Union, 2010).

3.4. Training projects

- **Raising awareness of seperating recyclable and biodegradable wastes in their sources**

The details of "raising awareness about seperation of biodegradable and recyclable wastes separation in sources" Project, prepared by Burdur, Erzincan, Karaman and Malatya municipalities in Turkey, and the municipality of Linköping in Sweden are as follows:

The aims of the project

- The overall objective of the project is to improve quality and efficiency in municipalities.
- The specific objectives of the project are recyclable, biodegradable and sustainable business activities that allow for the disposal of waste for the purposes of developing market conditions and developing the capacity of municipal services in the area of sustainable waste management (Waste management, b.t, 2010).
- Target group are the local residents of the partner Turkish municipalities and the employees of those municipalities. Final beneficiaries are specified target groups, the partner municipalities, neighbouring municipalities and the local companies that want to be a stakeholder. (Waste management, 2010).

Basic activities

Firstly, raising awareness for the waste separation of domestic waste at source, so that the waste can have a beter quality for the industrial use.

Secondly, making the waste accessible and attractive for recycling industry by encouraging to store wastes in regular storing areas and in the isolated cells.

Municipalities will provide the necessary infrastructure for waste collection and transportation services. Biogas obtained from the landfill in the municipality of Linköping will provide expertise for tech companies working in the field of energy production (Waste management, 2010).

Expected results

The seperation at source with the partner municipalities, and increased level of seperation at source will provide will provide work space for a "cleaner" waste process (Waste management, 2010).

3.5 Spatial designs and implementations

- **The project for the evaulation of the hersek lake as a wetland ecosystem**

Hersek Lake, is one of the rare lagoon lakes and which is registered as a first degree natural heritage site, the project aims to provide a positive environment for species to live and breed. The project is performed by Altınova Municipality with an aim of creating a natural habitat and protecting wetlands which are important for the future. This project has been selected for the "Special Environmental Incentive Award" from Healthy Cities Association (Hersek Lake Project, 2011).

"The protection of wetland species and environment arrangement, 1st Stage Avant Project" covers the south and west of the lake of Hersek. A healthy environment is intended as the first aim of the project. (Hersek Lake Project, 2011).

Hersek Lake is located on the tourism route of Yalova, blue road project. Due to the natural beauty of the area and presence of many ancient historical monuments such as Helenepolis many educational activities, daily entertainment, leisure and recreational activities (bird watching, bird photography, hiking, fishing, etc.)can be considered as an alternative tourism for the area(Hersek Lake Project, 2011).

In addition to being an important bird area and wetland ecosystem, the area is first degree natural site and has an importance of archaeological site. Altınova Mayor Dr. Metin Oray, who said they were careful to seperate daily life from the ecologic system considering Herkes Lake and its environment as recreation, gathering, relaxation, entertainment and sport field. (Hersek Lake Project, 2011).

- **Green roof systems: Chicago city hall**

Green roof systems allow for the management of rainwater from environmental and ecological perspective. In an urban environment, the use of materials like asphalt roads and concrete materials have the possibility of limiting permeability of rainwater in a large amount. However, green roofs constitute the environment for rain water absorption and permeability. In urban areas where impervious surfaces exceed 40%, green roofs have an active role in reducing the stream of stormwater. Green roofs do not control only the micro-climate, but, at the same time, it can also be done with the volume control. The greenery surrounding the buildings reduce wind speed and absorb the sound waves. Located in the downtown of Chicago, Chicago's City Hall roof garden of a quarter acre is at a height of 33 meters from the streets of Chicago with extensive, semi-intensive and intensive roof types which demonstrate green (Erkul, 2014). 1.885 m^2 green roof is located on the 11th floor, on the roof terrace. Although the building is approximately 100 years old, green roofs could be implemented. From an ecological perspective the implementation is important. Municipal building coating was made inclined for excess rainwater evacuation, and structural supports were provided for semi-intensive and intensive roofs in the areas of columns and lights. The purpose of the pilot study is to study on benefits of cooling urban heat island and measure temperature in metropolitan areas in order to improve air quality (Erkul, Sönmez, 2014).

In the edges of green roofs, retaining walls were used. Existing stormwater drainage system is however protected for the rainwater. (Erkul, 2014). Green roof was designed for the storage of water in the growing environment and drainage layer as far as the structural capacity of building roof allows. Rooftop plants and a variety of attractive color pattern (variant) offers a depth of the environment. Different plant species can be seen from the surrounding buildings. Green roof provides the effect of reducing the heat in the summer on the top floor, but this affects only 1/12 of the building. If green roof in a single-storey structure was considered, this percentage would find 100% (Erkul, Sönmez, 2014).

- **Ümraniye square project**

The square project was built in an area of 128 thousand square meters including IKEA with 70 thousand square meters of leasable area, 50 stores, 10 halls, a cinema complex and parking area for 3 thousand cars (Etüd mimarlık, b.t,trans ;Erkul, Sönmez,2014).

Pedestrian paths consisting of ramps and stairs sometimes connect to green roof and allow for people to reach green area. The square seems to be under a green hill by using different coatings. It was designed to be the meeting point for concerts, fundraisers, exhibitions, live performances, such as entertainment, sports, culture and art activities as well as fun activities. Roof area is approximately 55000 square meters and 30000 square meters of it is green area. The square, with this feature, has the largest green-field roof in one area in the world. The project consists of extensive and intensive green roofs. When we sort the layers within the system from the bottom to the up, the carrier layer, a vapour barrier layer, insulation layer, moisture-retaining layer and a waterproof layer, a drainage layer, a filter layer, a layer of vegetation and habitat take place. (Erkul, 2012). In very sloping areas, georasts are used to keep the soil and plants alive (Erkul, 2012).

3.6. Urban social and economic projects and implementations

- **"Polluter pays" principle in poland and financing project for environment**

Towards the end of the 1980s, Poland reached a dangerous pollution level. That more than 30% of the population lived in areas carrying ecologic risk, more than 35% of rivers were not appropriate for industrial use, excessive levels of air pollution in many cities shows the greatness of the danger. This situation has necessitated the creation of an independent institution to manage and supervise the system and financial resources properly. In this context, the aim of this project was to create an independent institution responsible for collecting and distributing environment protection funds.

Activities within the scope of the project

Initially, the National Federation of Opticianry Schools (NFOS)'s all income was obtained from environmental fees and payments as a result of environment use. In 2006, the process of adapting Polish law to European regulations resulted in the new additional payments at energy sector and recycling process of vehicles. As a result, emissions of pollutants were reduced to a large extent, however the funds collected from environmental fees increased and they have amounted to 300 million euros per year today.

The results of the project

On the basis of the "polluter pays" principle, an independent environmental financing authority was created and this has quickly started the process of improving environmental quality in Poland.

So far, the NFOS has given support to more than 14000 environmental projects, and has become a key element in Polish environmental financing system. It has provided financial support for activities such as protection of soil, water, air and nature, and eco-education. These investments have improved significantly the quality of the environment in Poland and the environmental awareness of citizens has increased.

The sustainability of the project

As a result of adaptation of EU directives, assistance of the EU in environmental areas and most importantly rotating system developed by (NFOS), and the funds arising out of all these constitutes a permanent foundation for an efficient environmental financing that will last for many years in Poland. More importantly, payment system which is also important for the field of eco-friendly investment financing in Poland has not slowed the conomic developments and because it is in close coordination with Ministry of Environment, it can be both flexible and effective. This system, as stated by the World Bank, the OECD, the EU and others, has gained significance in the international arena (Best environmental projects from the European Union, 2010).

- **City program project to reduce greenhouse gases- france**

Greenhouse gas emissions largely depend on decisions at the local level. PRIVILEGES project was aimed at decreasing greenhouse gases withing the scope of LIFE-Environment programme and it is compatible with the context of the principles implemented in Chalon- sur-Saone city. At national level and at European level, the aim is to create a sample effect with the implementation in question.

The aims of the project

- The project in question was planned to mobilise the different local actors (enterprises, households, and local governments).
- The purpose in the project is; identification of operating means to reduce greenhouse gas emissions and
- Decreasing the effects of economic activities on climate.
- Project includes forming an “eco-industrial” action plan and a local community plan.

Activities of the project

- Exhibitions in the fields of climate change, energy efficiency and arranging renewable energy sources,
- Creation of project website,
- Distribution of tools to increase awareness about climate change in schools,
- Creating an eco-industrial action plan and its implementation, thus the evaluation of energy and waste stream, then taking measures to reduce them.

The results of the project

The heating of municipality’s public and private buildings were measured (offices and homes). Also the greenhouse gas emmissions from public space lighting have been measured. These measurements have beem inspected and analyzed to be reduced (Best environmental projects in Europe, 2010).

CONCLUSIONS and SUGGESTIONS

Recent urbanization problems, consumption of natural sources and the excessive consumption raise major questions about the future of cities. The trends that consider the city as a commodity to be used necessiates the development of urban policies from an ecological perspective much more significant. In order to develop such such policies ecological approaches must be one one of the main goals in local governance. Public participation and involvement of different stakeholders in this process is also very important.

This paper explained the significance of ecological approaches in local governace systems with sample projects that have been implemented. The implemented projects, in other words “the best practices” consitute a process that all imply stakeholder involvements and sharing of the results with the local residents. Such a process increases the success of the projects.

Ecological approaches in local governance have to be considered in various fields such as urban policy developments, urban infra structure, urban design and planning, training and social activities. Each field implies activities to achieve the goals of ecological approach in local governance. These projects may cover wider areas, and they may be applied at regional scale, or they may be much more local site specific. Ecological approaches in local governance may involve both the local and central authorities, thus cooperation between different authorities may be necessary for efficient ecological local governance.

For ecological local governance, first of all both local and central authorities need to develop policies in accordance with the ecological approaches. For instance, sustainable development-oriented policies shall be improved, environmental policies which contribute to income and employment, especially in rural areas and the poor areas of large cities shall be promoted, environmental action plans shall be developed locally in accordance with the central government, in coastal areas integrated coastal management policies shall be adopted, assesments for health-environment relations shall be made, natural, historical and cultural values shall be protected for a safe and healthy environment to ensure sustainability

In the recent years, it has been found that, implementation of such projects are getting more efficient if public is getting involved much more in the process. Creating public awareness, and training for this goal is another major issue of ecological local governance. In order to create public awareness campaigns and social activities are being carried. These activities besides training also imply punishment and reward incentives.

All these discussions points to the importance of public involvement in local governance to achieve the goals of ecological approaches. For a higher life quality, environmental carrying capacity of cities have to be considered and all these goals necessiates much more public involvement in the process of ecological local governance.

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Chapter 28

The Techniques Improving the Creativity in Landscape Design Process

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INTRODUCTION

Design courses have an important place in the process of landscape architecture education. Landscape architects who create outdoor activity areas use plants as well as inorganic materials as organic materials. While creating spaces in the design process of landscape projects, appropriate unities are created by making a correct boundary element selection and using basic design principles and elements. Each project is treated as a design problem. These unities should be a solution to a problem both aesthetically and functionally. The balance between the aesthetic and functional status in the hard and soft ground design can be carried out under a right scenario. During scenario creation, the main themes and activities created for this scenario are associated in accordance with the objective that is set for the subject and the solution of the problem. Landscape design actually means to associate. In fact, it is the design of the boundary lines that determine the precise relationship between pavement-lawn, user-activity-space, user-lawn, user-pavement and create spaces.

The steps of a landscape design process are given as an example in Table 1 below (Collins &Adleman, 1998)(Booth & James, 2005)(Waterman, 2012).

Table 1: Landscape design process

1. Survey 2. Site plan (base plan) 3. Site inventory 4. Site analysis	
5. Data collection for the project topics 6. A list of requirements- a list of activities 7. Determination of the theme 8. Selection of the activities 9. Creation of the "relationship-functional diagram" for the activities in the scenario 10. Completion of scenario	The process followed in the Project 1
11. Creation of land use decisions / creation of stain design 12. Production of options 13. Master landscape plan 14. The final design 14.1. Layout plan 14.2. Grading plan 14.3. Planting plan	

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In this process, the steps listed below are carried out as the techniques improving creativity;

- A list of requirements - a list of activities (analyses of inspiration sources such as animation, cartoons and etc.),
- Theme determination (brainstorming, examples),
- Creation of the scenario (analyses of inspiration sources such as animation, cartoons and etc. brainstorming, examples, creative drama),
- Activity selection,
- Creation of "relationship diagram" for the activities in the scenario.

1.1. Why the techniques improving creativity?

1.1.1. Analyses of inspiration sources

The analyses of inspiration sources can be performed to nurture imagination and creativity, transform abstract ideas into concrete products and analyze the abstract-concrete oriented design elements and principles (Kocabaş Atılgan, 2014). An applied example of a project, a film, a novel, a period in history, an art movement, nature, and etc. can be an inspiration source.

1.1.2.Brainstorming

Brainstorming is used in the field of design to produce solutions to problems, appropriate theme ideas and thoughts, creative and original opinions and to provide an exciting and creative environment (Arıdağ & Aslan, 2012).

Brainstorming or *idea storming* is a continuous quality improvement tool that supports creative thinking and allows plenty of ideas to be produced in a short time and to make inferences regarding the causes of process failure by motivating team employees. This concept was developed by Alex Osborn, an advertiser. Brainstorming can be done alone or with a group. The ideas are demanded to be disclosed just as they come to a mind. Ideas cannot be judged and criticized initially and no idea can be regarded as absurd and in this way individuals are helped to express their ideas without any hesitation just as they come to their minds. The ideas are assumed to nourish each other and evolve (Wikipedia, 2016).

Brainstorming is a technique used to provide a solution to a problem, make a decision and produce ideas and thoughts through imagination. Its usage areas are;

- Developing new products: To produce new products or improve the existing ones.
- Advertising: To develop a product campaign.
- Problem solving: Basic reasons, alternative solutions and impact analysis.
- Production management: To improve business and production.
- Project management: To identify the customer requirements, risks, resources, tasks, responsibilities, problems and the ones which can be achieved.
- Team building: Sharing and discussing the ideas by encouraging the participants to think about (Wikipedia, 2016).

1.1.3.Creative drama

Creative drama in education is used to enable students to imagine, visualize and explain events based on their life experiences, increase the demand to learn enthusiasm, motivation and communication (Adıgüzel, 2013; Üst & Doğan, 2013).

Creative drama is useful for the development of creativity and imagination and a positive contribution to student performance, self-confidence, being participants, effective communication, independent thinking and socializing (Önder, 2010; Adıgüzel, 2013).

1.1.2. Creative drama in design

- Spatial thinking and perception,
- Realizing the principles of a game and design,
- Being an effective student,
- Thinking, questioning, problem-solving individuals,
- Exploring the process-based learning,
- Converting conceptual ideas into real life,
- Enabling students to do analysis,
- Enabling students to make synthesis,
- Detecting a pattern,
- Creating a more competitive products (Arıdağ & Aslan, 2012).

1.2. Creative drama and design education

The word 'Drama' is drawn from the word Dran which includes the meanings of being on the move, being determined to do something, conversion and motion. As for the creativity, it is an ability including intellectual and emotional dimensions; thinking in a different way by going beyond the existing patterns, creating new forms and regulations by regrouping the parts. We can call the transfer of thoughts or feelings of a person to an object, an individual or a society through a verbal or physical act as communication. All these concepts form the basis of creative drama. Therefore, drama activities can be defined as a set of events including action, the interaction between individuals or between individuals and the nature and they consist of intellectual or sensory motion (Şener, 2007).

Since drama activities basically include a gaming state, it enables participants to exist in the process with all their emotional and intellectual dimensions. As this situation activates the focusing, imagining and sensory perception, it greatly contributes to the ability of individual free thinking creativity. Therefore, drama activities requiring creativity and individual perspectives are used as an effective method in education. If we take into account the students' differences in social and cognitive levels especially in the areas that accept students with a central placement rather than a special skills exam, drama activities are effective means of transferring creativity and original expression skills to a certain dimension/level (Adıgüzel, 2013).

Creative drama techniques which have been used in education since 1920s are thought to create physical and mental experiences in adults as well as children and learning takes place while being in full activity in terms emotionally, mentally, and physically. Therefore, drama activities are accepted as one of the most effective active learning techniques (Önder, 2010).

Drama activities may contain many techniques such as playing a role, improvisation, dance, puppetry, painting, miming, story and event animations and envisaging. According to the targeted educational objectives, the creative drama process is created by selecting a series of techniques completing each other. The process of creative drama consisting of warm-up, main exercise, relaxation and discussion should be at a predetermined time in an appropriate environment according to the objectives and should be guided by a leader. It is important to be perceived as a purposeful activity rather than a leisure time game by participants (Adıgüzel, 2013).

Creative drama is a tool which is used to achieve the goals of the field where it is used as a method. In fact, it is a route which is followed to attain the goals to solve a problem, to learn or teach a subject and to conclude an experiment (Adıgüzel, 2013). This route corresponds to a technique and a targeted configuration. Creative drama is used in the training of different areas other than their own issues. Creative drama enables the subjects to be taught in accordance with a dramatic clash and through visualizations in the areas that have a student-centered approach and require critical thinking and different needs. At this point, it is important to configure the activity in a goal-targeted style. Creative drama activities in all areas require a configuration including warming, visualization and evaluation stages (Boal, 2014).

It is the warming stage that makes the participants focus, become aware and prepares participants physically and mentally for the process at the beginning of it. As this stage aims to activate participants' experiences related to the topic as well as rhythmic blood circulation, visualization techniques through movement, dance or music are preferred. In the visualization stage, playing a role and improvisation techniques are mostly used under the guidance of a leader. This stage is the main section of the process in which the individual differences and the awareness reflect most, the creativity is activated and learning through experiences is at the forefront. As for the evaluation stage, it includes a question and answer period in which the results and the achievements in the working process are discussed and interpreted in a goal oriented way (Adıgüzel, 2013).

As a result, creative drama is an effective way to convey the concentration and the performance to the highest level and force the limits of imagination in the areas requiring individual perspectives and creativity. Using this technique based on motion and movement through experiences in a student-centered education approach in design education will cause the project that individuals focus on in an education process to result positively. In addition, as individual and social awareness will lead to the development of communication skills and creativity, it is a great way to have a positive impact on life processes (Adıgüzel, 2013; Önder, 2010; Boal, 2014).

1.3. Modal Technique?

- To explain "Space" concept better,
- To develop the ability of expressing three-dimensional vision,
- To describe and understand the land,
- To provide advantages while producing options
- To have an advantage of adding or removing elements in case of changes,

It is easily understandable for even a person who does not know map and contour lines (Waterman, 2012). It is also advantageous for the students who do not know other narrative transmission techniques yet.

Three-dimensional architectural expression method which is prepared with or without scales in order to perceive the difficult points in architectural drawings better is called a model. A model is generally a three-dimensional model of a means of expression which is minimized depending on a certain scale. Due to being three-dimensional, models and model making is important in terms of detecting the errors that may occur in the implementation of architectural drawings in advance (Özkaya, 2016).

It is essential to develop the perception of three-dimension and three-dimensional design thinking skills of a student studying design. To this end, model technique is an effective technique used from the past to the present. Of course, when compared with computer technology, although it has many shortcomings, it is a fact that it has many advantages in the process of education (Kurdoğlu *et al.,* 2008).

In this context, the design training process followed by the students studying at KTU Faculty of Forestry Landscape Architecture department in their 1st project has been discussed and described in the book section.

METHOD

In the project course which is mentioned in our study, within the scope of Research and Investigation Through Education (Dewey, J., 1997), Problem solving, Collaboration, Project Techniques in accordance with individual study methods, Brainstorming techniques, Creative drama techniques and assignment (Yılmaz, & Sünbül, 2000) (Tan, & Erdoğan, 2001) (Özden, 2000) techniques that were listed according to Üniversite&Toplum, 2016 were used.

The path followed in this study is described step by step below (Table 2) in addition to reviewing the studies by Arıdağ, & Aslan (2012) and Ün Açıkgöz (2007).

Topic: children and play

Workspace: an imaginary space with the dimensions of 50x70cm

Study objectives: to design an area and spaces with the certain dimensions in 1/100 scale in accordance with the basic design principles for the children at a specific age group that you determine.

Learning outcomes of the study:

- to be able to design a field of plastic depending on user activities and design concepts,
- to be able to define human needs for a specific outdoor space and design activity areas on the basis of this information,
- to be able develop a non-existent field of plastic by fictionalizing depending on its function.

Number of students: 9

Table 2: The design process that is followed

1. Collecting information according to the project themes,	
2. Making a list of requirements– a list of activities (inspiration analyses such as animation, cartoons and etc.) 3. Determining the theme (brainstorming, case studies) 4. Creating Scenarios 4.1. Selection of activities 4.2. Creation of "relationship diagram" for the activities in the scenario	The Techniques Improving Creativity
5. Producing options for the design of a topography and activity areas using model technique 6. Presenting the outcome products	

1.4. Data collection

Data were collected by reviewing the studies and articles regarding the concepts of child and game and then these two concepts and the relationship between them were clearly revealed. In parallel with this, the students were asked to create a list of activities and their needs.

1.5. A list of requirements and activities

In this step, a list of requirements and activities for the identified age group were created (Table 3). For this aim, in addition to the information obtained during the data collection step, all kinds of materials that could be inspiration sources such as cartoons and animations were analyzed. In order to develop an activity list, determine the theme and create a scenario, as homework, the students watched animations, cartoons and fantasy films which could be inspiration sources, read story books, described the places in these books and films, determined the activities, the ranking of activities and did analysis of the photographs of successful design products suitable for the theme and objective.

Table 3: An example of a requirement-activity and space list

the needs of children at the age of…	Activity (play)	Play area
for their "physical development"	Climbing	Climbing areas
for their "social and emotional development"	Drawing pictures with their friends	The areas where they can draw pictures with their friends
for their "cognitive development"	Reading books	Reading areas

1.6. Determination of the theme

Each of the students in this step has determined a theme parallel to the game with the contribution of *brainstorming techniques* and possible examples of *inspiration sources* with the analyses and the studies in the previous two steps (Figure 1).

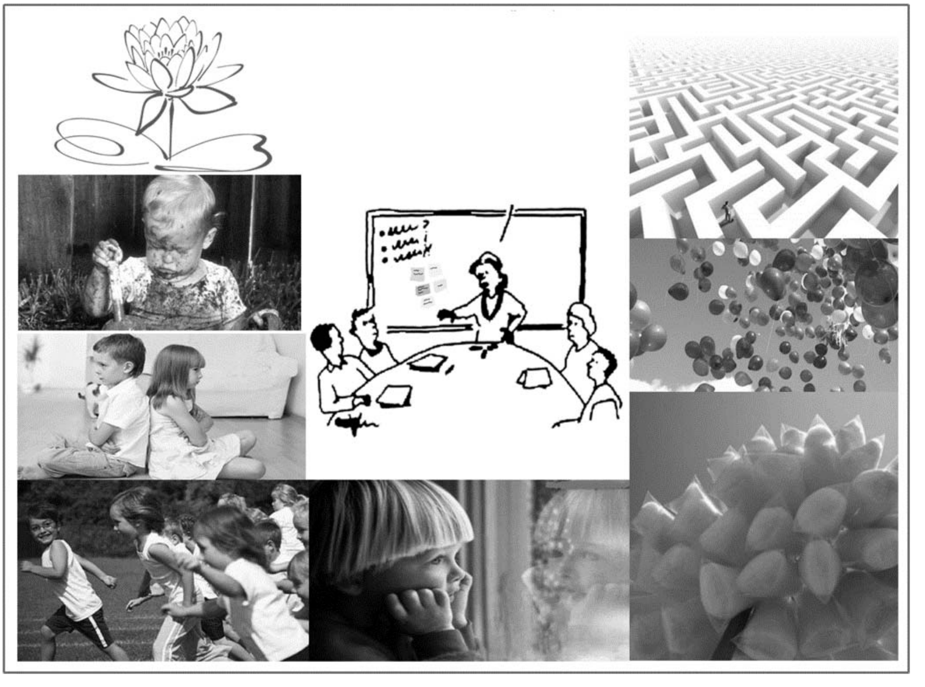

Figure 1: "Brainstorming" regarding the concepts of child and game

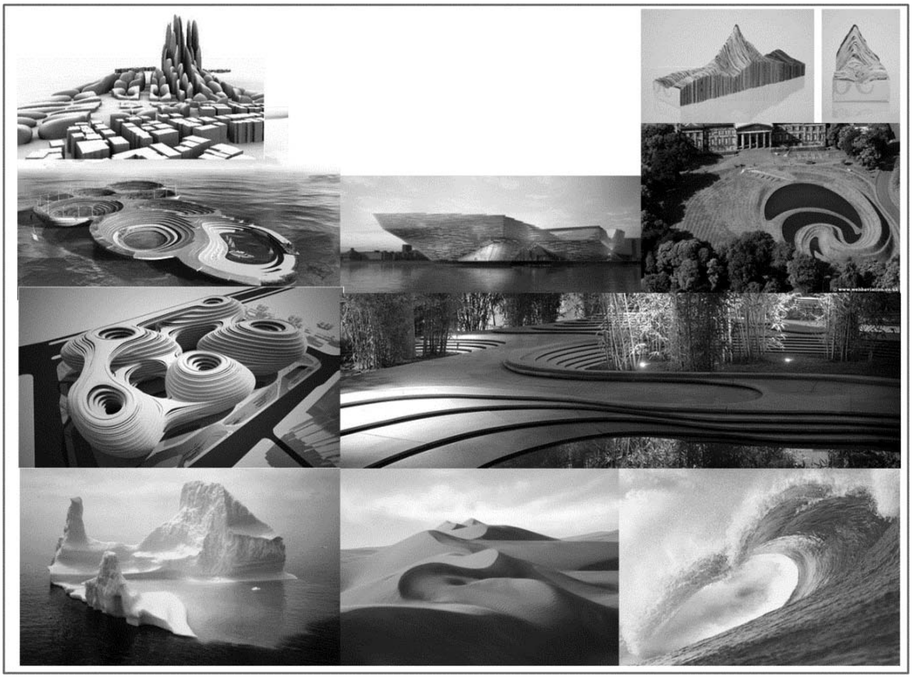

Figure 2: Possible examples about inspiration sources

In addition, the students benefited from *Creative Drama Activities* while determining the themes related to children and game. They carried out the activities listed below under the leadership of the course professor.

- to warm up and the leader's explanations (figure 3)
- to participate in musical drama and visualization (figure 3)
- to symbolize through movements (children and play) (figure 4)
- to symbolize through movements (movement) (figure 5)
- to symbolize through movements (solidarity) (figure 6)
- to symbolize through movements (adrenaline) (figure 7)
- to symbolize through movements (labyrinth) (figure 8)

Figure 3: To warm up and the leader's explanations and to participate in musical drama and visualization

Figure 4: To symbolize through movements (children and play)

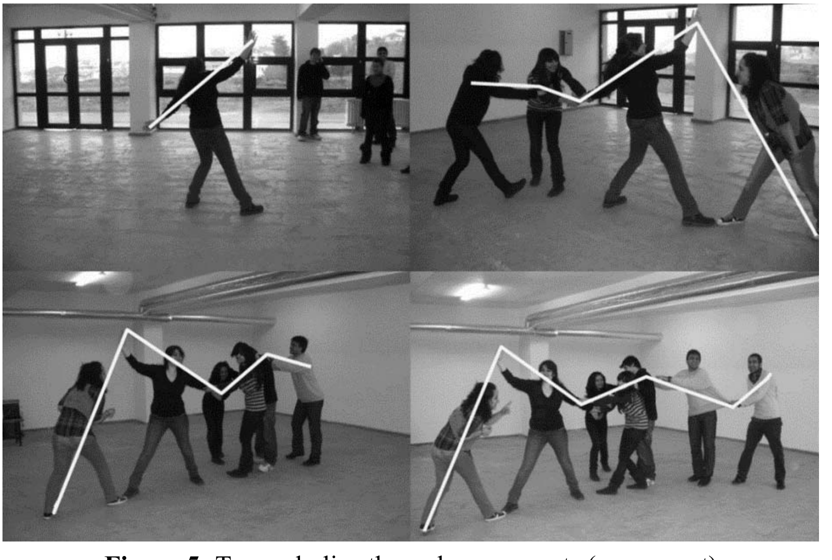

Figure 5: To symbolize through movements (movement)

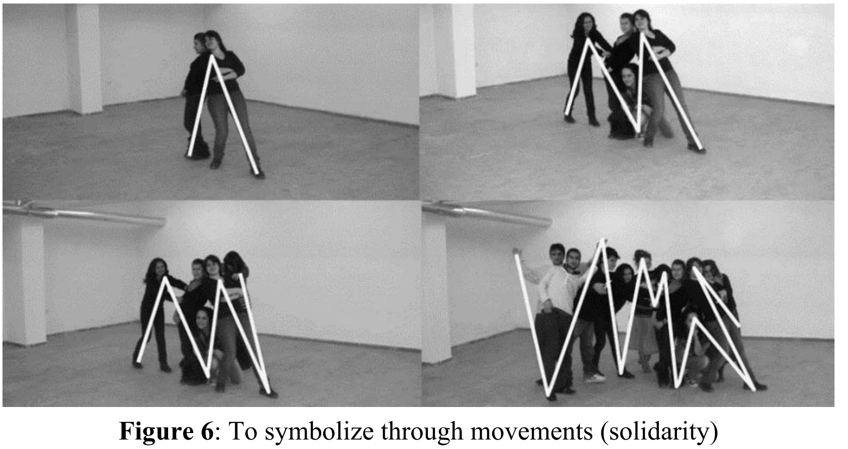

Figure 6: To symbolize through movements (solidarity)

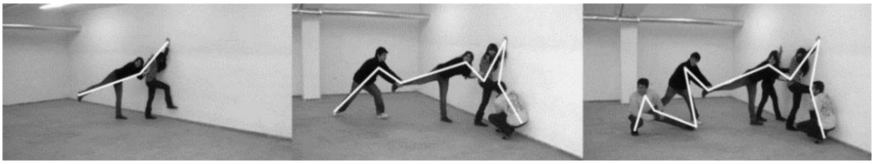

Figure 7: To symbolize through movements (adrenaline)

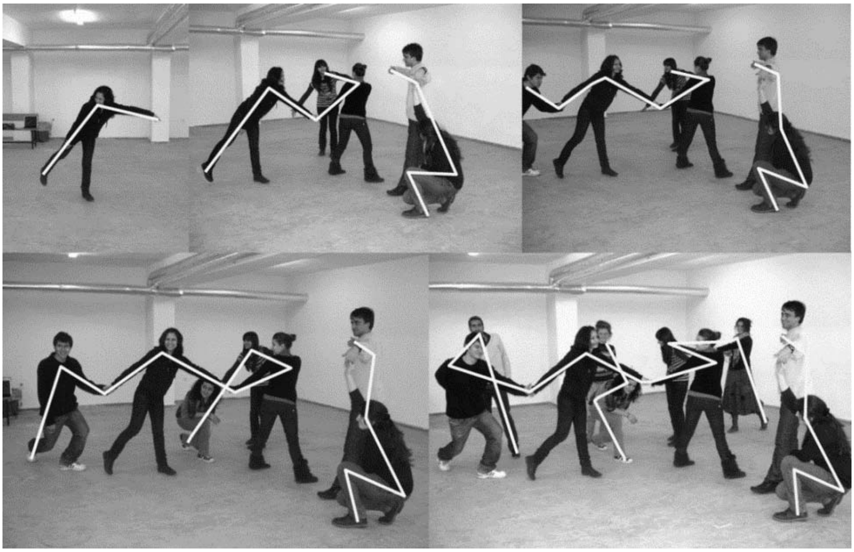

Figure 8: To symbolize through movements (labyrinth)

1.7. Selection of the activities for the scenario

Following the determination of the theme, the activities for the scenario have been chosen from the list of events created in the 2nd step. Each student in this process has chosen the activities from the list of requirements and activities in accordance with his/her own set of themes (Fig.9). These are classified as other activities that support the main activity.

Figure 9: Selection of the activities

1.8. Creation of the "relationship diagram" for the activities in the scenario

A relationship diagram that demonstrates the relationship between the activities which have been selected according to a specific theme with each other has been created. With this relationship diagram, the organization of the activities 'coming side by side and their ranging has been performed by prioritizing the activities (Figure 10).

The diagram showing the interrelationships within the selected activities

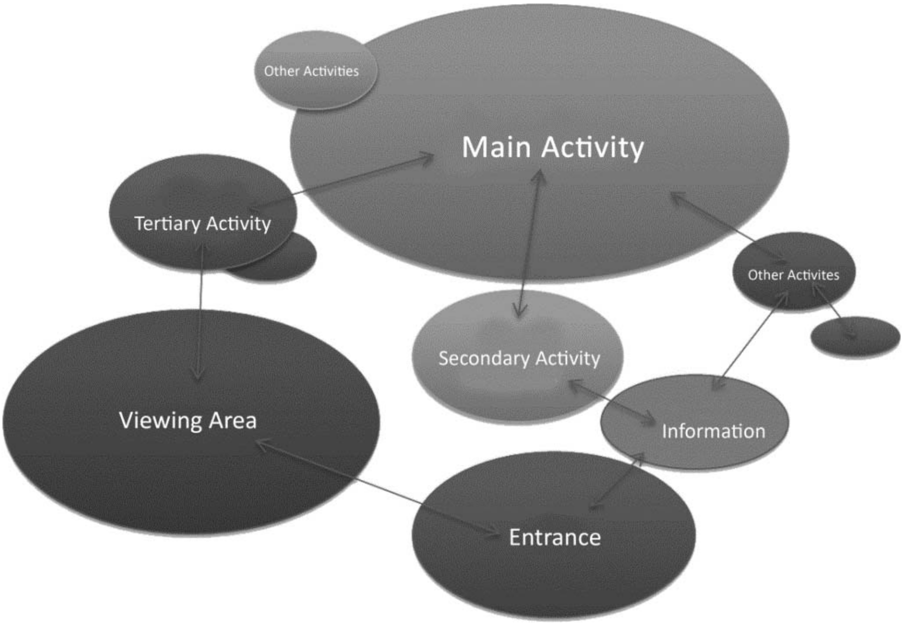

Figure 10: Relationship diagram

Figure 11: Completion of the scenario

1.9. Completion of the scenario

Then a detailed technical article describing the form of land and the activity areas disintegrating in this form in details has been created. This is a step in which a scenario including the explanations and the answers to the following items is created;

1. Both the land and the events are described,
2. Which activities,
3. Where? (location and forms of spaces),
4. With whom? (size of spaces),
5. When? (the order of spaces),
6. In what kind of relationship? (closeness and distances of the spaces),
7. What kind of spaces? (color, texture, size, shape etc. of the spaces) and

8. What kind of topography? (how spaces create a unity).

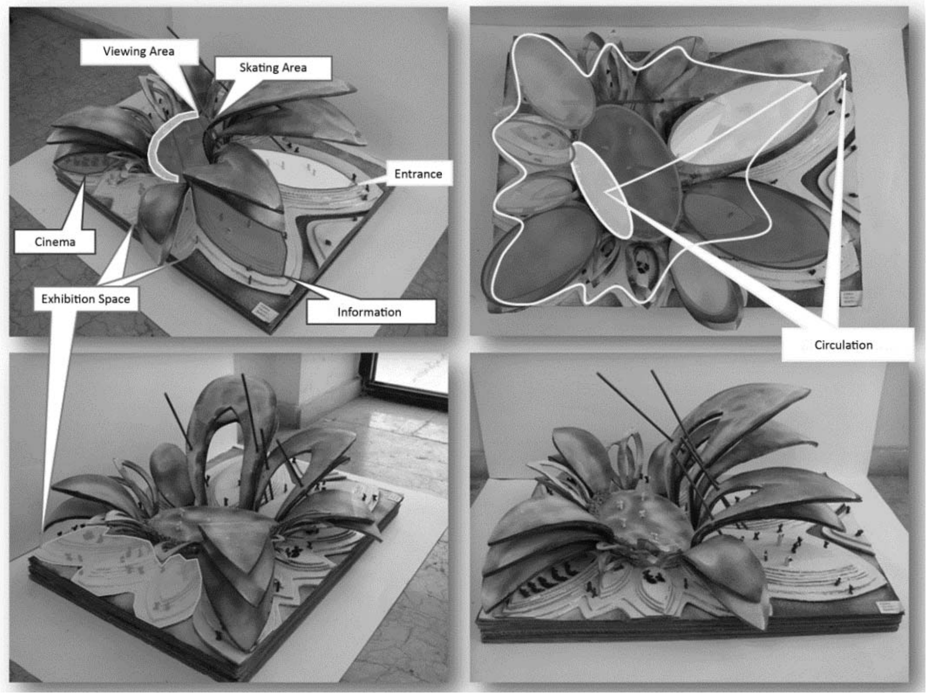

Figure 12: Product (movement)

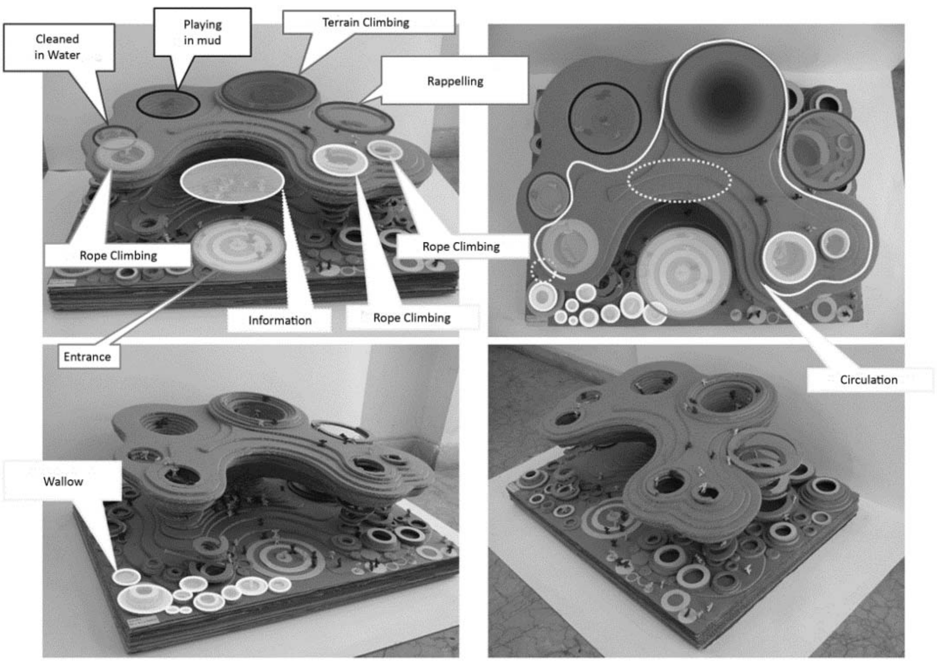

Figure 13: Product (solidarity)

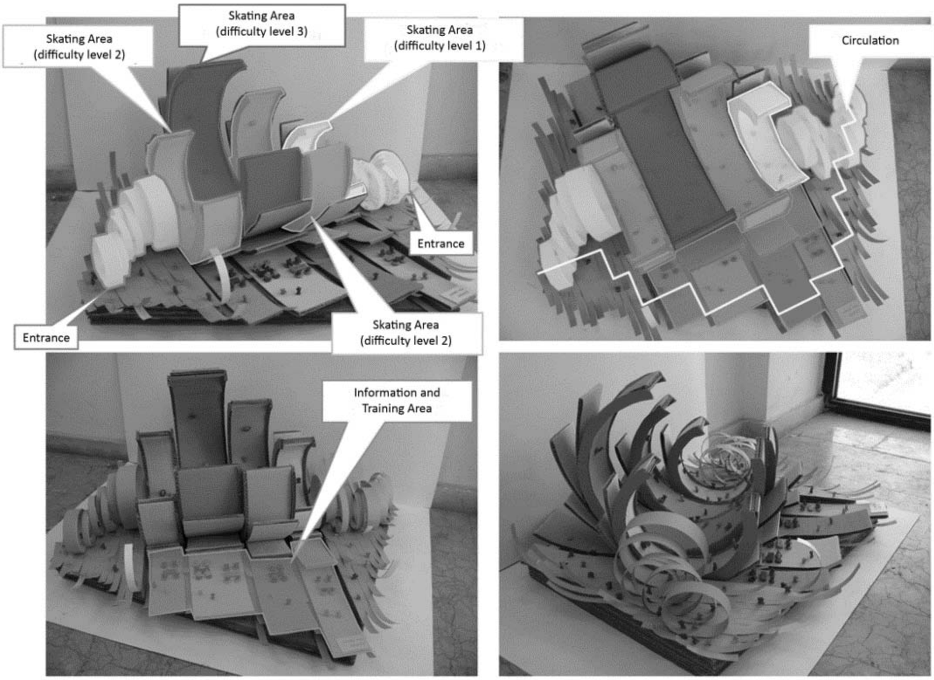

Figure 14: Product (adrenaline)

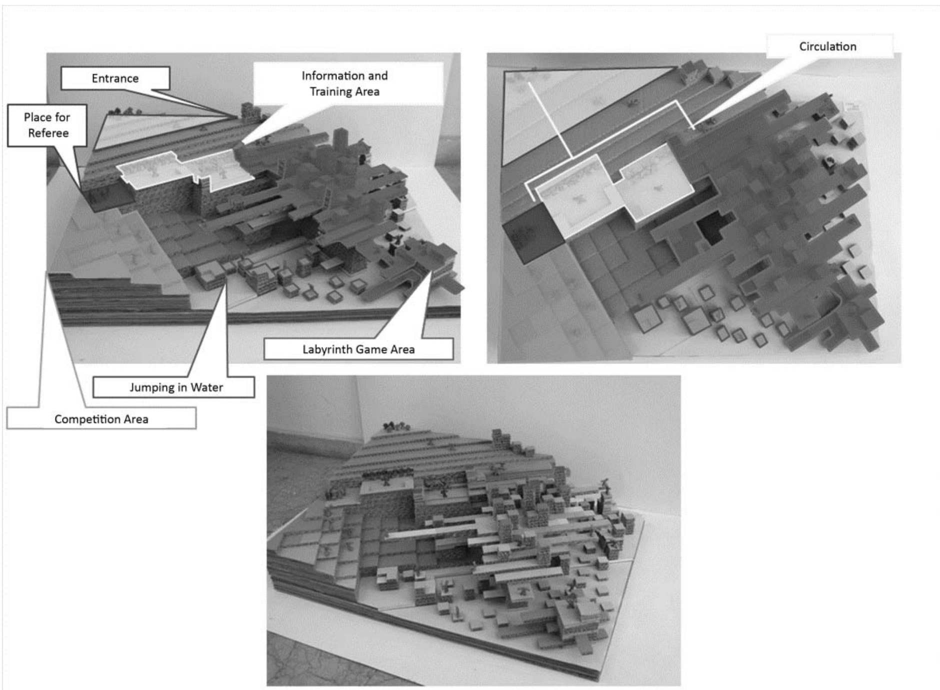

Figure 15: Product (labyrinth)

1.10. Project production process and the presentation of the results

This is the last step where each student produces options for the design by using a modal technique of topography and activity areas and then reveals the product results according to their own scenarios (Figure 11- 15).

DISCUSSION and CONCLUSION

As a result of the design process followed in the 1st project conducted by the 1st year students studying at KTU, Forestry Faculty, Department of Landscape Architecture, parallel assessments that were carried out by the students and the lecturer of the course have yielded following results;

Students have stated that this process;

- has increased their motivation,
- has increased their interest in the course and the desire to attend it,
- has provided a positive contribution to their self-confidence,
- has provided a positive contribution to the communication and
- makes them realized that the design may follow a challenging but an enjoyable process.

The lecturer has expressed that the students have been very successful in terms of;

- being interested in the course,
- attending the course,
- understanding the design process,
- expressing themselves,
- communicating,
- producing options for the sake of seeking answers to the problems,
- being able to reveal an outcome production,
- being able to reveal successful products.

The process has been satisfactory both for students and the lecturer.

Acknowledgement

I would like to express my sincere gratitude to the 9 undergraduate students in the project group of Assist. Prof. Dr. Banu Çiçek KURDOĞLU’s "Environmental Design Project 1" course at KTU in the spring semester of 2009-2010 academic years.

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A small section of this chapter was presented in 2011 as a poster (“A Sample Performance on the Use of the Creative Drama for Landscape Design Training”, 48th IFLA World Congress, June 27-29, 2011, Zürich, Switzerland, Proceeding, p.422, Poster presentation).

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Chapter 29

Utilization of Living Walls in Urban Ecosystems

Makbulenur BEKAR*, Nilgün GÜNEROĞLU**

INTRODUCTION

The rapid and unbalanced utilization of natural resources, technological developments, urbanization and growing populations caused unprecedented environmental problems such as pollution, fragmentation and lose of green coverage. In addition to creating ecological problems, deterioration of green spaces may also produce air, aesthetic and noise pollutions in urban habitats (Guneroglu *et al.,* 2013). Moreover, dense housing can lead to extra psychological pressure on people by interrupting their connection with parks, gardens and nature where they can smell and breathe the freshness of the green spaces. Therefore, the total areas should be enhanced to crate favorouble conditions for expanding the green texture in urbanized centers. Within this context, green ways, green roofs, urban parks, rain gardens and vertical gardens have attributed a special importance as they used to solve green space problem of the big cities. Vertical gardens can be placed at first stage as they offer perfect solution to create extra green spaces where the area is very limited to implement horizontal landscape designs. They may also contribute to biodiversity and air quality of the surrounding environment (Yücel & Elgin, 2001).

The history of surface planting design and the vertical gardens go back to hanging gardens of Babylon (B.C.600) which is one of the Seven Wonders of the World. In 17.century, different usages of ivy, climbing plant, rose and grapes were observed on the walls, hedges or entries of castles, manors and gardens. In 1980s the vertical planting design became easier by using steel cable surfaces to reach higher elevations and cover wider surfaces (URL-1).

Living walls, also known as vertical gardens or green walls, is simply a planting design technique that based on plant breeding on vertical surfaces. Vertical gardens are conceptually designing of facades or walls of buildings by using garden design principals. Beside their aesthetical contribution to the architecture, vertical gardens are used for building protection, climatological comfort, enhancing environmental conditions and minimizing environmental problems. Therefore, they are also ecologically important designs of urban landscapes (Yüksel, 2013; Ding, 2008).

Desingning of living walls have grabbed great attention among designers in world wide scale as a tool to mitigate the adverse effects of decreasing green coverage. Moreover, the new building concept is oriented towards ecologically sustainable green architectural designs to offer better comfort and green niches (Crawley & Aho, 1999).

The aim of the study is to introduce the concept of vertical gardens by explaning

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their design, construction and contribution to visual quality of the landscapes from different geographic locations of the world. Furthermore, the importance of the living walls was also stressed in terms of urban ecology and sustainable landscape design concept.

FUNCTIONS OF VERTICAL GARDENS IN LANDSCAPE DESIGN

There are many functions of vertical gardens in landscape design such as shadowing, termal isolation, cooling and wind breaking (Wong & Baldwin, 2016). Geographic location, climate, building style, building position, plant type and related green wall design components are the main determiners of the design projects. All functions summarized above can be evaluated in two categories or scales which are "urban scale" and "building scale (Giocomello & Valagussa, 2015).

Urban Scale Functions: Vertical gardens can be definetely used to mitigate the adverse effects of urban heat island, balancing the ambient temperature, enhancing the air quality, assimilating the CO_2, contributing to biodiversity and creating ecological habitats in urban ecosystems. These are the main functions of vertical gardens in urban scale.

Building Scale Functions: There are much functionality of vertical gardens in building designs such as creating better thermal comfort environment, energy isolation, enhancing inner air quality, raising the O_2 level, decreasing noise level and filtering the air.

The main functions of the vertical gardens are explained in detail in following section.

Shadowing function: Creation of a green texture on building walls can greatly alter the micro-climatic conditions of the surrounding environment around the constructed structures. The difference between inside and outside ambient tempearture on building walls is diminished by means of vertical garden plantations. Vertical gardens act as natural air-conditioners when they used on buildings' walls (Wong & Baldwin, 2016).

Isolation function: Living walls can be implemented on building surfaces to absorb the temperature and protect the thermal energy inside the building by reducing the radiation level (Perini *et al.,* 2010).

Cooling function: Transpiration is a vital metabolic process of the plants and it can be explained the respiration process of the green plants (URL-1). The water is absorbed by the plant roots and transferred to the stems and leafs to be used in metabolic activities and finally evaporated from the stomata (Brown, 2000). Evapotranspiration by the green plants reduces the ambient temperature as the energy absorbed by the plants covered the wall surfaces acting as cooling material (Wong *et al.,* 2009).

Wind breaking function: Vertical gardens can be used as wind shield or a barrier to protect the building walls from wind stress and preserve the energy of the building to keep it warm (Olette, 2011). Liivng walls can be very effective (25%) in reducing the heating energy demand of a building (Dinsdale *et al.,* 2006).

Carbon assimilating function: Green plants act as a carbon capturing engines of the nature through a well-known peocess called phytosynthesis. Due to their important capability of assimilating the the CO_2 in the atmosphere, vertical gardens can help to reduce the global warming and create healthy sustainable environments as well as increasing the availability of fresh O_2 in the atsmophere (URL-1).

Energy saving function: Vertical gardens can be used as isolation designs on buildings exteriors to save from demanded energy (Yüksel, 2013). Living walls can enhance the climatological condtions aound the buildings' surfaces and increase the inner energy available for the buildings as well as cooling the hot surfaces of a building by providing natural shadows. Plants used for vertical gardens protect the buildings from direct sunlight in summers and enable intrusion of sun light in winter due to defoliation (Loh, 2008).

UHI reducing function: Benefits of vertical gardens are not limited by only buildings of interest but also they can also be extended to the local surrounding environment as they help to reduce the ambient temperature around the residential areas which suffer from Urban Heat Island (UHI) effect by means of evapotranspiration process. Thus the thermal comfort of the area becomes more suitable for elderlies and childrens which are the most of the population threatened by UHI effect (Yüksel, 201; Davis & Hirmer, 2015; Dihkan *et al.,* 2015).

Inner air quality function: Vertical gardens are also called bio-walls due to their ability of enhancing the inner air quality of the spaces (Loh, 2008). Green plants are capable of using photosynthetically active radiation to produce glucose and oxygen which is very important for ambient air quality (Yüksel, 2013).

Noise barrier function: Green plants can also be used as noise isolating material around the buildings or on highways as hedges to filter both the noise and the particles. Eventhoguh, they are not very effective in noise filtering, they reducing the incoming noise level by scattering it at different directions and absorbing the noise wave (Loh, 2008).

DESIGN AND APLICATION STAGES OF THE LIVING WALLS

a. Plant selection

The first step of creating vertical garden involves making decisions on climate and insolation conditions of the aplication area. Furthermore, growing quality of a plant, the suitability of the wall, temperature resistance, drought tolerance, wind stress tolerance, aeshtetic functions, pruning requirements, transplantation tolerance, endurance to air and water pollution, endurance to diseases and harmfull substances and maintenance are the main factors that should be considered during the plant selection (Yeh, 2012; URL-12). Moreover, taxon type, annual or perennial species are decided in accordance with project type or design under consideration (URL-2).

The selected plant type should have low water demand, adaptable to local climatological conditions and durable in order to minimize the maintainace problems. Irrigation and fertilization are automatically designed in vertical garden systems (Yeh, 2012). Living forms of the selected plants is decided according to project designs but generally they are climbing, windering plants or some forms of bushes.

Climbing Plants: They are best suit to the wall system without using axullary materials. They can cover the wall system without trouble in relatively short periods.

Windering Plants: They can cover the axullary materials such as fences, wires or cages by their shoots, branches or stems. Eventhough, they can stich themselves to the walls using their thorns, they should be supported and fixed by using additional materials.

Table 1: Plant species that can be used in vertical garden designs

Plant Specie	Seasonal Feature	Life Form	Feature	Colour	Flowering Seasons
Akebia quinata	Semi evergreen	Wrapping	Flower	Pink	April-may
Hedera helix	Evergreen	Wrapping	Leaf	Green	-
Parthenocissus quinquefolia	Deciduous	Wrapping	Leaf	Red	-
Parthenocissus tricuspidata	Deciduous	Wrapping	Leaf	Red	-
Hydrangea petiolaris	Deciduous	Wrapping	Flower	White	May-June
Polygonum bauldschianicum	Deciduous	Wrapping	Flower	Pink	
Lonicera periclymenum	Deciduous	Wrapping	Flower	Pink	May-June
Lonicera spp.	Semi evergreen	Wrapping	Flower	Yellow	May.-Haz.
Clematis vitalba	Deciduous	Wrapping	Flower	White	June-August
Clematis sp.	Deciduous	Wrapping	Flower	Purple	June-August
Humulus lupulus	Deciduous	Wrapping	Fruit	Yellow	-
Aristolochia spp.	Deciduous	Wrapping	Flower	Red	March-Octob.
Jasminum officinale	Deciduous	Wrapping	Flower	White	June-July
Vitis sp.	Deciduous	Wrapping	Fruit	Purple,green	-
Wisteria sp.	Deciduous	Wrapping	Flower	Purple	March-April
Campsis radicans	Deciduous	Wrapping	Flower	Orange	June-July
Passiflora caerulea	Deciduous	Wrapping	Flower	Purple,white	March-Octob.
Lathyrus odoratus	Deciduous	Wrapping	Flower	Purple,pink	May-July
Tropaeolum spp.	Evergreen	Wrapping	Flower	Orange	Şub-Mart
Rubus fruticosus	Evergreen	Wrapping	Fruit	Burgundy	-
Jasminum nodiflorum	Deciduous	Wrapping	Flower	Yellow	June-July
Rosa canina	Deciduous	Shrup	Flower	Pink	April-May
Rosa sp.	Deciduous	Shrup	Flower	Purple,red	April-May
Forsythia suspensa	Deciduous	Shrup	Flower	Yellow	April-March
*Cotoneaste*r sp.	Deciduous	Shrup	Fruit	Red	-
Pyracantha atalantiodes	Evergreen	Shrup	Fruit	Red	-
Virginia creeper	Deciduous	Wrapping	Leaf	Pink	-
Ficus pumila	Deciduous	Wrapping	Leaf	Yellow, green	-
Luzula sylvatica	Evergreen	Herbaceous	Leaf	Green	-
Heuchera 'Obsidian'	Evergreen	Shrup	Leaf	Burgundy	-
Polystichum polyblepharum	Evergreen	Herbaceous	Leaf	Green	-
Tiarella cordifolia	Evergreen	Herbaceous	Flower	White	May-July
Polystichum setiferum	Semi evergreen.	Herbaceous	Leaf	Green	-
Asparagus 'Sprengeri'	Evergreen	Herbaceous	Leaf	Green	-
Chlorophytum comosum	Evergreen	Herbaceous	Leaf	Yellow, green	-
Ampelopsis aconitifolia	Deciduous	Wrapping	Fruit	Green,red	June-July
Ampelopsis brevipedunculata	Deciduous	Wrapping	Fruit	Green,blue	June-August
Ampelopsis megalophylla	Deciduous	Wrapping	Fruit	Blue, red	June-August
Campsis radicans	Deciduous	Wrapping	Flower	Orange	July.-August
Campsis radicans 'Yellow Trumpet'	Deciduous	Wrapping	Flower	Yellow	July.-August
Clematis alpina 'Frances Rivis'	Semi evergreen	Wrapping	Flower	Purple	April-May
Clematis x fargesioides 'Summer Snow'	Semi evergreen	Wrapping	Flower	White	July-September

Scattered Bushes: These are not climbing or windering plants and they need to be fixed over meshed steel wires or fences during the application of vertical garden designs (Yüksel, 2013).

b. Application techniques

Vertical gardens can be designed according to user, designer and area requirements with different styles. For example deciding on foliage character of a candidate plant is applied in accordance with climatological and insolation conditions of the region of interest. Then, the landscape designers decide if the plant should be deciduous or evergreen. At this stage, climbing plants passively use the sunlight and they are considered self regulated landscape design elements (Ayaşlığil, 1988). For example, *Virginia creeper* is one of the most used deciduous windering plant in vertical garden design with its very dense green texture that absorbs the most of the downwelling sunlight. This plant can prevent the harmfull radiation penetration by 40-80 % but allow necccessary amount of the sunlight in winters to reach the building walls (Ip & Lam, 2010). Because, this plant does not have leaves with very dense texture in winters to prevent incoming sunlight (Perini *et al.,* 2010). Moreover, some plant species that can be used in vertical garden design are documented below in Table 1.

Application techniques of vertical garden design can be evaluated according to plant type, soil availability, irrigation technique and surface application material (Yücel & Elgin, 2010).

Modular system mounted on gridded panels

Using this type of modular system, designers can apply the vertical gardens either on building walls or on a standalone construction panels, it is known that this system can prevent the building from high temperatures (Yücel & Elgin, 2010). It is the widely used technique in vertical garden designs, after installing the grid panels, necessary soil is placed on panel surfaces and then planting is applied in accordance with climatological and aesthetic considerations. The design and mounting of the wall system is given in Figure 1A, Figure 1B and Figure 1C in stepwise manner (Yüksel, 2013). Planting is applied on stainless steel surfaces with caution until finishing the whole surface of the panels (Figure 2). Irrigation, fertilization and moisturing are also provided to the system with minimum human interference (URL-2). The construction matrials can be various such as plastic, polyester, synthetic fabrics, clay, metal or concrete.

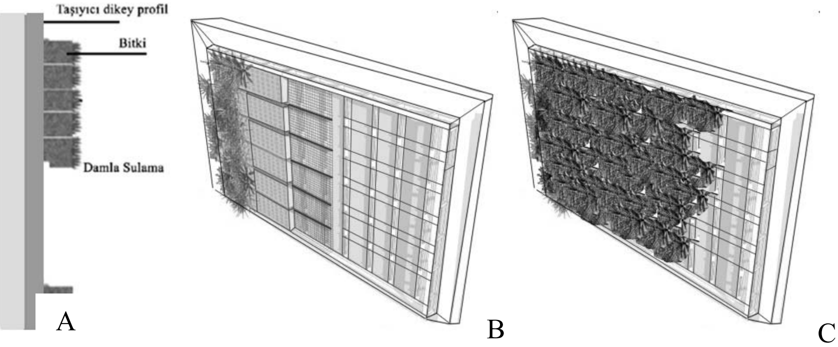

Figure 1. A. Modular vertical garden system, B:Stainless steel panels, C:Applied system

Figure 2. Vertical gardens constructed on panels (URL-3)

Potting system mounted on gridded panels

In this technique after construction of the gridded panels, designer start the planting outside the sytem by using planting pots and then the planted pots are carefully placed on the panel system to finish the vertical garden. The sytem summary is visually depicted in Figure 3a, 3b and 3c and Figure 4. This technique can be easly applied inside or outside with minimum maintenance requirements (URL-4) Figure 4. Irrigation is supplied by separate propylene pipes.

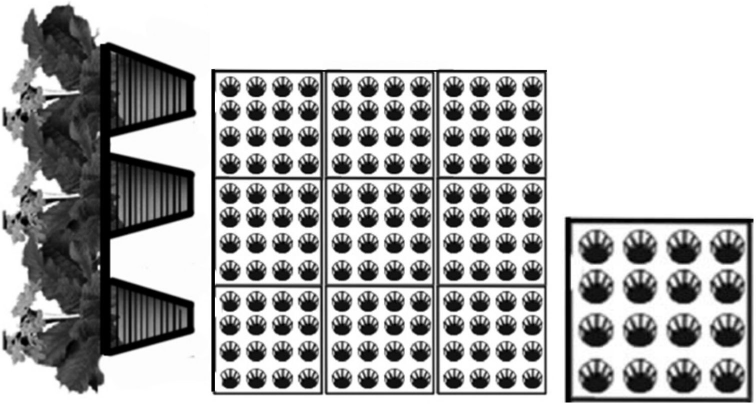

Figure 3. A: potting system, B: vertical garden design, C:system panels

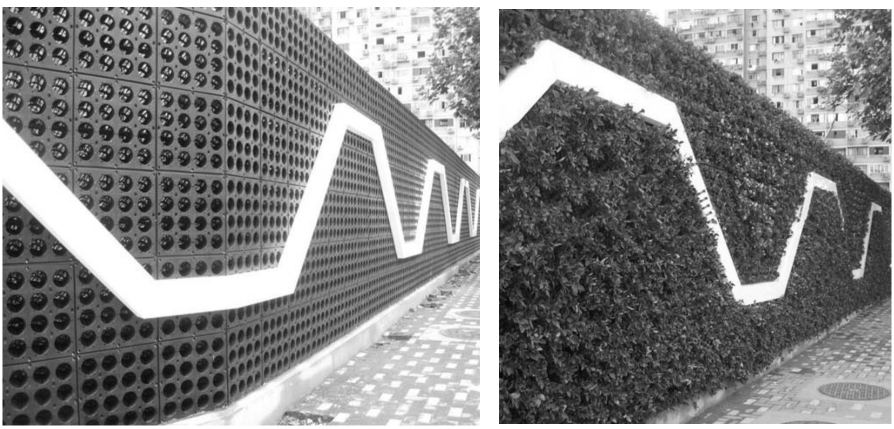

Figure 4. Aplication of the potting system (URL-4).

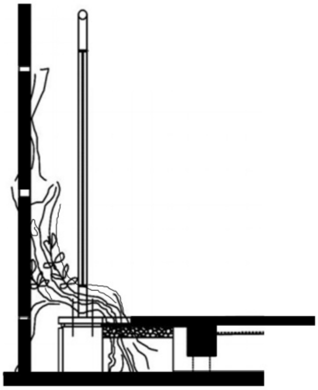

Figure 5. Application system of metal fence vertical garden

Metal fencing system

In this technique plant directly or previously prepared in pots and brought to the application area to plant in soil. Irrigation is also done on the same surface (Fig. 5). It is very important that in this type of vertical planting the plant should be a climbing type (Yüksel, 2013). This technique is appriopriate for creating green covers or semi permeable green textures with previously determined direction and size (Yücel & Elgin, 2010) (Fig. 6a). This sytem can be used to create moveable and different vertical green textures (Fig. 6b).

Figure 6. A: Metal fence system (URL-5), B: Metal fence system (URL-6).

Felting system

Felt is naturally fit to life cycle of a plant and enhance the growing conditions if minerals are added to the system. The irrigation is mechanically applied in this system. The felt should not be moisturized on stitched wall surfaces othervise it may deterorate the wall structure. Thus, an isolation system is required between the felt and the wall surface before the beginning to apply the felting vertical garden designs on building walls (Fig.7b, Fig. 8a). These surfaces create borders inside the whole vertical garden design (Fig. 7c, Fig. 8b). The irrigation water of the system can be re-used (Fig. 7a) (Örnek, 2011).

Hanging system

Hanging system is one of the most astonishing technique of vertical garden design (Figure 10a). The windering plants are used in this type of systems (Figure 9b). Plant roots can be mounted on surfaces to create a hanging style or pots can also be used on building sides to create vertical gardens (Fig. 10b) (Yücel, 2013). In order to create surfaces that allow the plant attachment, steel tighted wires or meshed systems can be used (Fig. 9a) (Örnek, 2011; Yücel, 2013). In this type vertical garden design, drip irrigation or root surface irrigation are preffered. (Stoneman, 2008; Örnek, 2011).

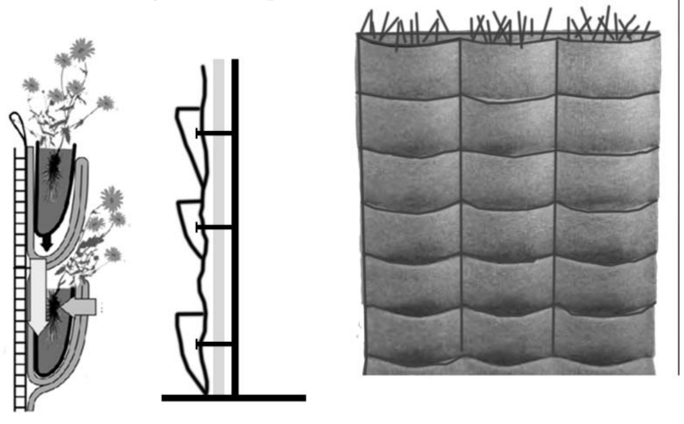

Figure 7. A: Application of felting vertical garden system, B: Mounting pins and waterproofing layers, C: Planting pockets

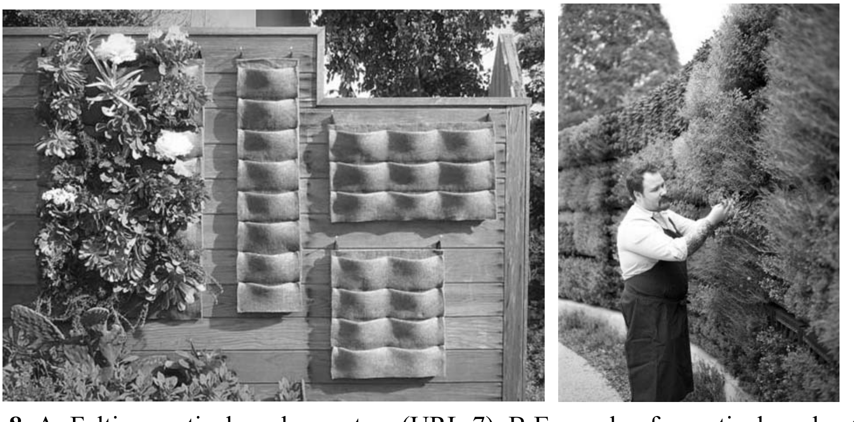

Figure 8. A: Felting vertical garden system (URL-7), B:Example of a vertical garden that is used in the healing garden (URL-8).

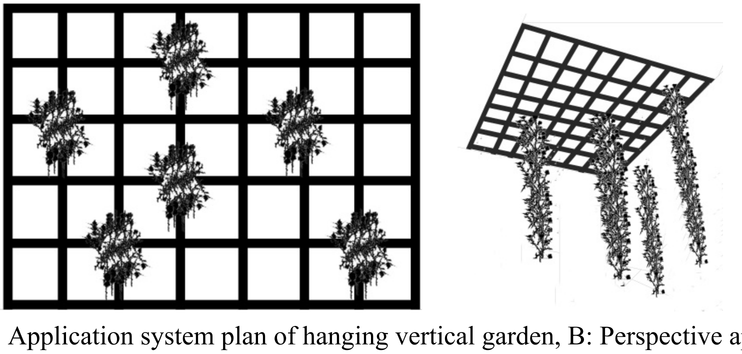

Figure 9. A: Application system plan of hanging vertical garden, B: Perspective appearance of hanging system vertical garden

Figure 10.A:Application example of hanging system, Miami Art Museum (URL-9), B: Hanging system combination with façade (URL-10)

EXAMPLES OF VERTICAL GARDENS

1. Bosco Vertical Tower: It is one of the most succesfull aplication of vertical garden design. The project has 18 floors and 2 blocks covered by very dense vegetation. It has 700 trees reaching 6 m in height and 20000 plant species (Fig. 11a). The design is made of consoles mounted vertically and can be easly reached from the residents. The used plants act as filters in out and inside environments (Fig. 11b). It offers special experience to the users. The design also shows seasonal coloration and various forms of different plants (Giocomello & Valagussa, 2015).

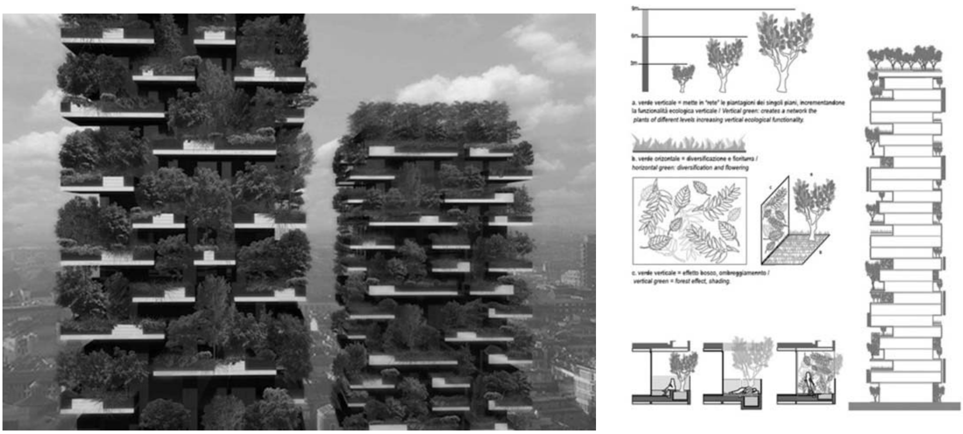

Figure 11. A:Penetration of the refracted light via plants and oxygen release (URL-11) B: Façade appearance of vertical gardens (URL-12)

2. MFO Park Vertical Garden

This design is from Switzerland, the system was applied on meshed steel wires and cables and based on hanging system (Fig. 12a). The flexible robust wires were meshed crosswise to create the hanging surface for plants. In this landscape design climbing and windering plants with different heights and coloration were used (Fig. 12b). Plants were placed on meshed surface on inside the soil or inside the pots in all spaces of the structure (Erdoğdu & Çetiner, 2014).

3. The Towers of Cedars

This garden is designed by Italian architect Stefano Boeri in Lausanne, Switzerland (Fig. 13). The plants are considered a green prototype harmonized with the earth. 100 cedars, 6000 bushes and 18000 different plant species were applied in this design with evergreen plants which makes it the first design in its group. Thus, the garden is named after the used tree types. The garden also contributes to the oxygen amount of the city weather. This structure is made of 36 floors with 117 m height (URL, 14). The residental buildings attract the potential customers as they offer many types of plants hanging from the balconies with positive effects on the building fronts.

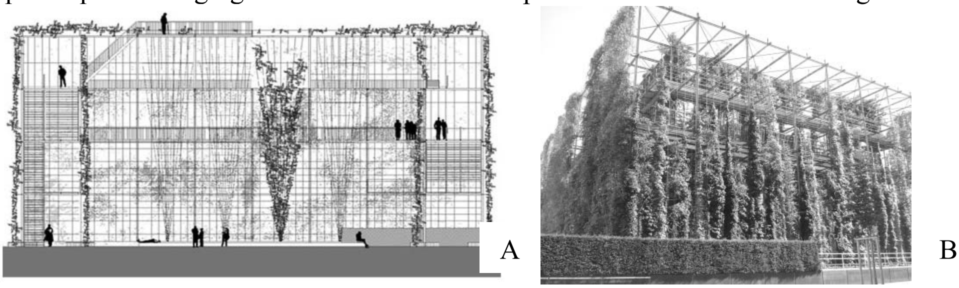

Figure 12. A: MFO Park vertical garden details (URL-13), B: MFO Park vertical garden, Switzerland (by Müberra PULATKAN)

Figure 13. Cedars towers (URL-14)

4. Pont Max Juvenal, Aix en Provence

This vertical garden is designed by Patrick Blanck in 2008 in France. It has natural plant forms mounted on 650 meter square area with 15m height (Fig. 14). Comparing pre and post consttruction of the garden, the application area has greatly and positively enhanced the application region by adding green living cover with high aesthtetic quality (Fig. 14).

Figure 14. Pont Max Juvenal, Aix en Provence öncesi ve sonrası (URL-15)

5. Vertical Garden Palace of Congress

This garden is constructed in Victoria-Gasteiz, Spain on 1492 meter square area (Fig 15). Some species used in this design are Carex mairii., Festuca sp., Bromus erectur, Avenochoa vasconina, Erica vagans, Ribes alpinum, Sorbus aucuparia, Cyperus longus, Sedum acre, Sedum sexangulare, Sedum sp., Sedum reflexum, Prunus spinosa, Teucrium pyrenaicum, Crataegus monogyna, Genista., Cyperus longus., Sustrato (Landscape World, 2014)

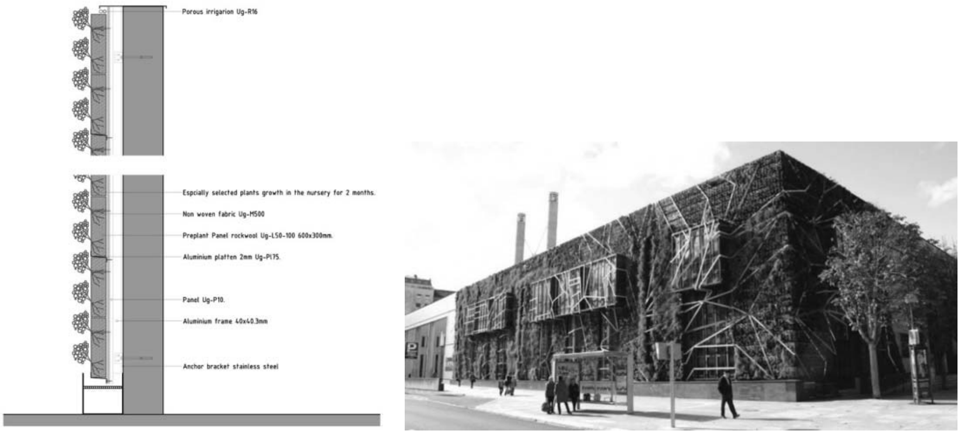

Figure 15. Vertical Garden Palace of Congress (Landscape World)

6. Icon Hotel

This garden is designed by Patrick Blanck in Hongkong on 250 meter square area (Fig. 16). It adds natural environment and living habitats to the application area. It helps to clean inner air quality in building structure. Entrance and foyers are the most attractive points in this garden. This garden is very astonishing due to its coloration, texture and plants used in design. The hotel has very positive feelings on customers in first glance.

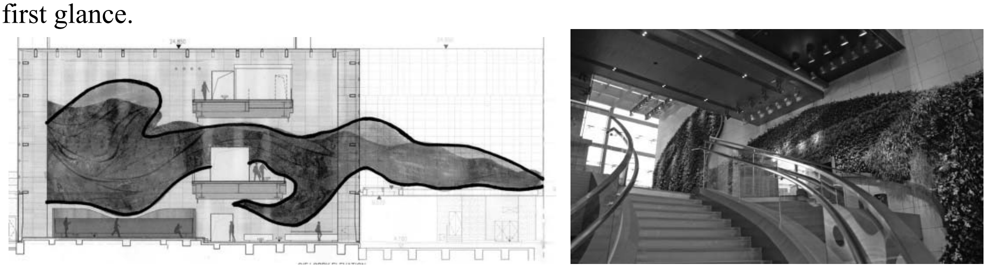

Figure 16. Icon Hotel (by Patrick BLANK, Landscape World Vol: 70)

7. Hotel Kaiserstuhl Hof

Located on southern Germany, the hotel is very attarctive due to its special vertical garden. The contrast between green texture on building walls and the red colored special plants on window fences is highly attractive (Fig. 17). Therefore, the building is a focal point for tourists visiting the city.

8. Dolce Vita Center Park

The Dolce Vita Center Park is designed by Patrick Blanck in Lisboa, Portugal

(Fig. 18). This shhopping center is one of the biggest one in Europe with very rich and aesthetic landscape designs. Plants with different forms and colors are merged to create contrasts that grasp the visitor eyes. It offers a natural in building spaces for visitors and workers of the center.

Figure 17. Otel Kaiserstuhl Hof, Germany (by Müberra PULATKAN)

Figure 18. Dolce Vita Center Park, Portugal (By Nilgün GÜNEROĞLU)

9. Loewe Barcelona

This garden is designed by Michael Hellgren in Barcelona, Spain with very dense green texture on vertical inside wall surfaces. A contrast is crated between metal materials and plants used. Focal points were also created by different lighting on two groups of plants in accordanc ewith light intensity. Natural species were preffered on surfaces that are open to day light conditions (Fig. 19). Different geometrical shapes were created by using the colors of the plants (Hellgren, 2015).

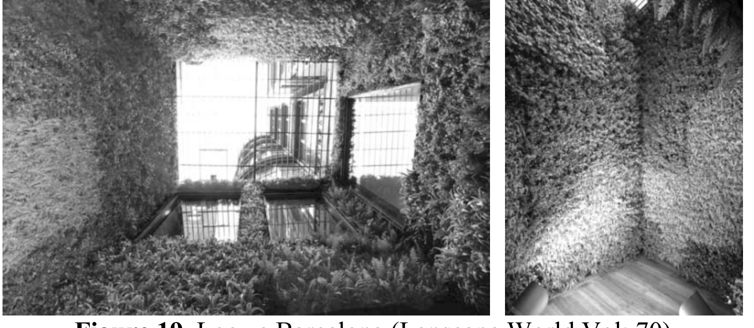

Figure 19. Loewe Barcelona (Lanscape World Vol: 70)

10. Westfield Shopping Center London

These vertical gardens are placed on wall surfaces of Westfield shopping center in London, United Kingdom. This design is very attractive for the vsiitors of the center (Fig. 20). The resting units placed in fronts of the vertical gardens are very attractive for the visitors and customers of the shopping center.

Figure 20. Westfield Alışveriş merkezi, Londra (By Müberra PULATKAN)

DISCUSSION AND CONCLUSION

Increasing population triggers unplanned urbanization which is called urban sprawl by degrading the quality and quantity of the green spaces. As a result not only green cover is affected by urban sprawl but also ecological sustainability, biodiversity and habitats became fragile and even extinct from the earth ecosystem day by day. Therefore alternative solutions needed to mitigate the adverse effects of habitat lose and ensure the ecological sustainability. Thus, vertical gardens can be considered as alternatives to enhance the green spaces in architectural designs. They can perfectly suit both to outside and inside architectural niches if they are properly designed. They help to ecological continuity by offer shelter and food to faunal assemblages. They also help to mitigation of global warming and climate change by absorbing carbon from the atmosphere. Their leaves help to clean the air masses inside the big architectural structures such as shopping centers as well as helping to filter indoor noise level. Increasing oxygen avaliability in indoor environment may also help to boost the working quality with very high productivity. Vertical gardens can alos find their place in hydrological cycle by aborbing the rain water. This can also help to regulate climatological conditions around the buildings by reducing surface material temperature level. Vertical gardens can also act as barrier for incoming outdoor noise. Vertical garden can help to create a jungle feeling even in very limited spaces.

Vertical garden designs are evolved in accordance with architectural advancements. As it stressed by Bass&Baskara (2003), at the very beginings vertical gardens are generally applied in indoor yards or foyers but lately this design concept is shifted more towards outside fronts or walls of the buildings. It is believed that vertical gardens can create pleasant and attractive environment which also helps to increase the real estate value of the surrounding areas. A project carried out in University of Toronto about vertical gardens suggest that vertical gardens can help the air circulation, energy efficiency and cooling of indoor environments and these special designs should be scientifically introduced and advertised among the users and designers (Bass & Baskaran, 2003).

Vertical gardens are also very important to recover decreasing green cover. They can help to link the green system of the city by combining green ways, roof gardens, niches and lineer plantations around the city. This would be the best alternative way to create green spaces when meeting the high demand of new residential areas.

Living walls can help to start a new farming concept called "vertical farming" which is an alternative revenue generating method for those want to increase their incomes. This is also important for refunding the expenses spent during the design and implementation of the veritical garden project. There many ecological, aesthtetic and psychological benefits of the vertical gardens in urban enviroments (Seçkin, 2011). The users feel themselves more comfortable if they are in close vicinity of a vertical garden. They feel happy, relaxed and stress-free inside the green gardens. There are many positive effects of green spaces that encourage the designers to include them for example in shopping center or hotel designs. The green color has a postive impact on human moral conditions. A building covered by vertical living walls can also inhabit many invertabrates, butterflies, bees and birds. They can help to pollination in ecological manner.

It can be concluded that grey and ugly urban textures with synthetic and rigid formations should be changed with soft, green and ecologically sustainable environments. This can be announced as "switch from grey to green" for inhabitable environment. The need for vertical garden in Turkey is high when compared to other designs in world wide scale. Thus, the benefits of vertical garden designs should be introduced to the potential users and included in architectural designs to raise the necessary public awarness as well as establishing the limits and design standarts of this eco-friendly technique.

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Müberra PULATKAN resim arşivi

Nilgün GÜNEROĞLU resim arşivi

Chapter 30

Applying Landscape Ecology Principles in Urban Landscape Design for Improving Biodiversity

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INTRODUCTION

From the historical perspective, most of the cities were established in areas with fertile lands and rich in terms of water resources. Therefore, cities have been precious resources in development of biodiversity over the years. However, technological development and rapid urbanization have led the alteration in the structure of cities, they are still valuable habitats for promoting biodiversity.

Today, more than half of the world population live in cities (Tratalos, Fuller, Warren, Davies, & Gaston, 2007). Research in the development and sprawl of cities predict that the population will be increased a few times more in future decades, because of facilities and advantages of urban life for its residents (Benedict & Mcmahon, 2002). As a result, more built area will reveal in urban texture along with population growth which means habitat loss will continue as well. Therefore, the persistence of changes in urban physical structure in parallel to population growth will prevent the recuperation process of habitats in their natural way in these productive lands.

Considering the pressure of urbanization in environment, many researchers assess it as one of the most effective human activities causing habitat lost (Mckinney 2002). As a result of urbanization, most of the natural habitats fragment, disappear or lose their functionality which cause destruction of urban biodiversity. There is some evidence representing the decrease in biological diversity in the built areas of city core (Muller, Werner, Kelcey 2010).

On the other hand, urbanization inspires the appearance of new habitats for non-native species or adaptation area for remnant ones. There are many studies; illustrating that the number of nonnative species decrease from the core of the city to surrounding (Kowarik 1995; Blair and Launer 1997; Mckinney 2002). Furthermore, there are some researches indicating increase in the number of wildlife in urban matrix (Ignatieva, 2010). Muller (2007) justified the reasons for high biodiversity in cities as follows:

- Cities often include relics of natural habitats- forests, rivers…
- Cities often include relics of semi-natural habitats - meadows, arable fields…
- The variety and distinctness of urban habitats - residential areas, gardens, parks, industrial areas, railway areas, brownfields
- Cities are centers of immigration
- Cities are centers of importation, naturalization and spread of exotic species.

That's why, there is still a glimmer of hope for promoting urban biodiversity

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despite the undesirable changes in urban area. Therefore, it is essential to diagnose the characteristics of this complicated ecosystem and utilize its features for improving urban biodiversity.

Towards these objectives, this chapter focused on the concept of improving urban biodiversity by applying landscape ecology principles in urban landscape design. For this purpose, necessity of urban biodiversity is clarified at the outset. Furthermore, the ecological characteristics of urban area and landscape ecology principle are explored in literature. In accordance with this data, applying landscape ecology principles in urban landscape design is discuss for improving urban biodiversity.

THE NECESSITY OF URBAN BIODIVERSITY

Today, urban biodiversity is not only the important part of urban ecosystem but also, it is a substantial ecological and cultural integrating element (Uslu and Shakouri 2013). Furthermore, native flora and fauna are significant tools for urban ecological and cultural identity.

On the other hand, as it is mentioned in most of the studies, biodiversity provides the ecosystem services on which all life depends (Cassady et al., 2010). These ecological services assort from provisioning services (food, water, etc.) to regulating (climate and air pollution regulation, flood and fire regulation etc.) and cultural services (Oliveira et al., 2011).

As it happens in natural areas, biodiversity enhance the functionality of ecological services in urban matrix as well (Gairola & Noresah, 2010). For instance, urban trees absorb pollutants which improve the air quality (Cassady et al., 2010). Furthermore, urban green areas can be effective in reducing greenhouse gases or urban heat island effects. The study on urban heat island in four areas of New York City illustrated that, there is average of 2 °C difference of temperatures between the most and the least vegetated areas (Susca et al., 2011).

As it was stated previously, urban areas tend to occur in areas which are biologically rich and ecologically diverse, such as river valleys or flood plains (Cassady et al., 2010). Therefore, the regulation effect of urban biodiversity is more notable in these area. Complex species assemblages also can rehabilitate the soil health. They can also have positive impacts on soil for absorbing the flood and filtering water. On the other hand, biodiversity loss can influence almost all services provided by ecosystems (Oliveira et al., 2011).

Besides the effects of urban biodiversity on ecological services functionality, they provide a source of aesthetic inspiration and numerous forms of health-sustaining recreation (Cassady et al., 2010). As it discussed, population is increasing in urban area and human life still depends on the nature and the ecosystem which they live in. Therefore, the number of research on the topic of creating more sustainable and livable cities have been increased over the years. Urban biodiversity as key concept in creating livable city was evaluated from different point of view. Study which was conducted by Groenewegen et, al. 2006 illustrated that natural environment has a positive effect on well-being through restoration of stress and attentional fatigue. Research of Ulrich (1979) demonstrated that the experiencing or simply viewing nature reduce the stress of daily life in urban area. Another research by Sullivan and Kuo (1996) represented that the presence of trees near public housing is related to decreased levels of domestic violence. In addition, there are large amount of research indicating the positive impacts of urban parks and gardens on mental and physical health (Kaplan1973, Frumkin 2001, Hill 2002; Jackson 2003). Considering the benefits of biodiversity and healthy ecosystems inside the city borders for urban residents; improving urban biodiversity is an indisputable need.

It also must be highlighted that urban residents have only access to the biodiversity which is found in urban area (Cassady et al., 2010) (Fig. 1). Therefore, development of natural and green areas in cities not only promotes species richness, but also brings a better quality of life for the urban residents. Accordingly, creating the biological awareness is vital for improving urban biodiversity.

Figure 1: Biodiversity which is found in urban area are the focal point for connecting people to nature (High Line Park New York-Original).

Beside the ecological and social function of urban biodiversity, it has positive aspects in economic terms. Generally, the urban areas with high range of biodiversity are more expensive than the other areas in cities.

The high prices of residents near the urban parks in most of the metropolitan is an evidence for effects of urban green areas in rising the land prices.

On the other hand, the research of Strohbach, Haase & Kabisch, 2009 represent that there is a relation between bird diversity with urban land use and socioeconomic indicators in Leipzig, Germany. Based on this research; the neighborhood with high socioeconomic status experience have more biological diversity. The reason is that; these places are most of the time locating in the areas around the parks or more green spaces.

Due to the ecological, economic and social benefits of urban biodiversity which is mentioned above; conserving and improving urban biodiversity is vital for ensuring the future of cities and human life.

ECOLOGICAL CHARACTERISTICS OF URBAN AREA

Evaluating the research in the concept of urban ecology illustrated that these studies back to the early 20th century (Collins et al. 2000). However, there is not still the comprehensive theory which defines the structure and function of urban ecosystems and its services in details. Therefore, most of the studies are about evaluating the ecological characteristics of urban area or the ecological process which are taking place in cities (Ndubisi 1997).

One of the research which focused on ecological characteristic of urban area is the research of Cadenasso and Pickett (2008) which interpret urban area based on five principles. They defined cities as an ecosystem in consequence of having interacting biological and physical complexes which is layout fundamental assumption of contemporary urban ecology. There are living organisms including people, vegetation, animals and etc. as well as physical components such as air, soil, water, light, and regulators such as temperature and day length. Despite the differences in location, size and surrounding environment of urban ecosystem, they are similar in structure, function and constraints.

Generally, in the case of the urban environment, cities can be defined as a single large ecosystem including all the individual ecosystems like parks, lakes, etc. or can be investigated as several individual ecosystems (Bolund and Hunhammar 1999).

Due to the diversity of patches in urban ecosystem; cities are spatially heterogeneous (Cadenasso & Pickett, 2008). This heterogeneity of urban area is expressed by three kinds of structural elements that exist and interact in cities (Ridd1995). These elements are; buildings and other structures, vegetation, and surfaces. The urban ecosystem as a human-oriented complex system including built areas and semi-natural areas within or around the city borders. As a result of the high variety habitats as well as the range of material used and the huge array of micro-habitants, urban landscapes often have a high species diversity even including rare and threatened species (Shepherd 1994). There is substantial evidence in some researches indicating that biodiversity in the urban area can be more than what is found in the rural areas surrounding (Qureshi & Breuste 2010). For instance, there are lots of examples indicate immigration of animals and plants to urban areas from their natural habitats. The reason of this immigration in most of the cases is food supply and lack of predators in urban habitats (Muller & Werner 2010).

Based on Cadenasso & Pickett (2008) research; an other characteristics of urban area is interaction between human and biophysical components of urban ecosystem over the time. Urban green areas such as parks can provide opportunity for interactions between humans and urban natural areas.

In addition to the characteristic mentioned above; cities are defied as dynamic ecosystem. Alteration and modification in the structures of ecosystem components within cities, and other ecosystems lend a dynamic element to urban form and morphology (Cadenasso & Pickett, 2008). The built structures, vegetation, and surfaces of the urban area is constantly changing. There is large amount of factors which ensure the dynamic of urban ecosystem. Vegetation cover of urban area is disappearing or fragmenting or in some cases replace by other non-native species. Based on Cadenasso & Pickett (2008) research; the other reason for cities dynamic is the differences in the management manner of urban planners or stakeholders. Due to the ecologically dynamic of urban environment (Savard et al. 2000), it can provide opportunities for improving the biodiversity and ensure beneficial insights into the management of biodiversity in other ecosystems.

Finally, the last characteristic of urban area is that; ecological processes are still at work and are important in cities. For the purpose of understanding the ecological process in city, it is significant to evaluate the city as an ecosystem (Alberti et al. 2003). Therefore, identification of urban ecosystem components and its characteristics will ensure its sustainability.

LANDSCAPE ECOLOGY PRINCIPLES

As it is stated in previous section, urban landscape is changing over the years. Generally, the modification of landscape can occur in two ways. First; new landscape elements (such as stains and corridors) may appear in urban mosaics change shape or scale. Second, components of the landscape can change the structure and function or composition. Because of these alterations in urban landscape; it provides a large range of habitats for improving biodiversity.

Research indicates that there are some differences in the biodiversity range from rural borders to urban core according to the different types of habitats. In the research of McKinney (2002); it is highlighted that the biological diversity decrease from the rural areas to urban, because of modification in natural habitats. Therefore, it is vital to improve the available habitat for promoting biodiversity. For this purpose, the landscape and habitat types in urban area must identified for providing protection and rehabilitation.

Muller et al. (2010) categorized urban landscape and habitat levels as follows;

- Remnants of pristine natural landscape (e.g. leftovers of primeval forests rock faces);
- Agricultural landscapes (e.g. meadows, areas of arable land);
- Urban-industrial landscape (e.g. city centers, residential areas, industrial parks, railways areas, formal parks and gardens, brownfields).

Considering the habitat levels in urban area, applying landscape ecology principles can be effective for developing or protecting these habitats in cities.

The theories of landscape ecology are based on the structure, function and the change of landscape (Forman 1995). Generally, the landscape structure represents the topography and physiognomy of its vegetation. Function is the interaction among the spatial elements in the ecosystem. Changes are all the alteration in the scale, structure or components of landscape.

Urban area was ignored to be evaluated as an ecosystem by ecologist until twenty centuries (Grimm et al. 2008). However, rapid urbanization in parallel to emerging of environmental problems makes it, distinct headline for many researches. Over the fifty years, huge amount of research have conducted by researchers in Central Europe and UK for clarifying the ecological principles of urban area (Gilbert 1989)(Wu, 2008)(Tzoulas et al., 2007)(Hersperger, 2006)(Niemela, 1999). For instance, Forman and Godron (1993) summarized the landscape ecology principle in seven spheres. The principles of the structure and function, biodiversity, flow of organism species, redistribution of nutriments, flow of energy, landscape changes and stability (Ružička, M., Mišovičová, 2009). In other studies, landscape ecology principles are evaluated from different perspectives.

From an ecological point of view, cities are unique mosaics of sites which are constructed for covering the requirement of urban residents (Breuste 2008). These mosaics are combinations of built areas and man-made green spaces. In addition to formal green spaces, urban areas include remnant natural green areas, derelict industrial areas, over grown gardens and ruderal sites (Breuste 2003). Considering the natural and built areas, urban ecosystem features can be identified using landscape ecology framework (Wu, 2008).

Landscape ecology field generally investigates the spatial relations between landscape and ecosystem's components, their structure, functional status and changes over the time. The aim is to support protection of habitats damaged by anthropogenic impacts, sustainability of natural areas and creation of green areas system. In this context, organization and combination of urban open and green spaces as important habitat for urban biodiversity has significant role.

In 1939 the German, biogeography Carl Troll used landscape ecology for clarifying the interaction between environmental terms and living communities in the landscape based on cause-effect relationship from wider perspective. Within this scope, landscape is investigated with its structure (distribution of landscape patterns such as patches, corridors and matrix), function (animals, plants, energy, mineral nutrients and water circulation between these elements), and change (changes in landscape mosaic depending on the time) (Forman and Godron 1986).

On the other hand, due to landscape ecology principles; landscape structure can be explained based on four fundamental spatial concepts, namely patch, edges and corridor and matrix (Dramstad et, al. 1996)

Based on the study of Dramstad et, al. 1996, patches in urban matrix can be in different sizes. The scale can be range from large urban forest to single tree. Besides the size of the patches, location is determinant factor in evaluating the urban landscape. These features of patches can influence the functionality of landscape (Dramstad et, al. 1996).

Edges are defined as the border which separates the patches from the environment (Dramstad et, al. 1996). The structure, width and species compositions are different inside the patch and edges (Dramstad et, al. 1996).
Edges may be man-made borders or natural ones such as river, wetlands and etc. Biological diversity usually is richer at the habitat edges. The reason is that; these areas provide environment with different characteristics which can countenance many species to maintain their life. Therefore, the edges of river, lake, stream, creak, canal or pond have particular value for wildlife (Fig. 2).

Figure 2: Natural edges in urban matrix (Florence-Original)

Because of the advantages of edges in enhancing habitat and species diversity and population abundance; patch with a longer border are more effective in supporting urban biodiversity. As a result, urban linear green spaces have significant role in maximizing edge effects (Blumenfeld, 1949 and Moughtin, 1996). Therefore, based on ecological principle, green network embedded within urban area are ideal for promoting urban biodiversity.

Due to these facts, an ideal city form could have one dominant center with several radial fingers to support edges effects on urban biodiversity. (Forman and Godron, 1986). This type of urban form; separates urban areas, enhances landscape impacts, and facilitates environmental and ecological functions.

Another element which has significant role in supporting urban biodiversity from ecological perspective is corridors. Corridoes act as barriers or filters in species movement between the patches. As a result of urbanization most of the natural patches are fragmented in urban area. Therefore, these corridors by connecting the patches alters the isolated patches to network of habitats.

The study by Vergnes et al. (2012) analyzed the effect of corridors on the variety of species, the number of individuals, the means by which species disperse (in the air or on the ground) and the main habitats in which the species are typically found. Due to the research result, corridors have assertive impacts on the dispersal of individual species. Furthermore, they allow the species to maintain community structure. Many researchers accepted the value of connectivity in forestry conservation and founding the movement of wildlife between habitat patches (Schaefer 2003).

In addition to the positive impacts of corridors in connecting patches inside the urban matrix, they can connect urban areas with regions locating in rural areas around the main city. As a result of population growth most of the cities are spreading to rural areas surrounding where original vegetation exists. Connecting these untrodden natural habitats to the remnant ones inside the cities can improve biodiversity indirectly. As a result of this connectivity, the network will function as larger units containing larger breeding populations and more complex food webs (Schaefer 2003). Furthermore, there are a lot of examples of corridors as ecological connection in European cities that bring nature into city centers and develop physical and ecological connection between built-up areas and natural and greens paces (Beatley 2000).

Dramstad et, al. 1996 described, the overall structure and functional integrity of landscape as mosaics. Mosaics can differ from the patterns and scales as well as patches. The varieties and quality of patches in urban mosaics is the advantages of urban ecosystem which make urban area to host large amount of species. Due to the Muller and Warner 2010, mixed and small-scale habitat mosaics, which are different from landscapes and land uses, by the various influences of people, result in habitat types and plant and animal associations or communities (Muller & Werner 2010). Therefore, mosaics are the most extensive and dominating landscape elements in terms of improving urban biodiversity from landscape ecology point of view. In parallel to landscape ecology principle, island biogeography theory (Mac Arthur and Wilson, 1967) provide fundamental strategies for green space system design in urban area for supporting urban biodiversity. In this context, the size of the island and the distance to the mainland or potion of any island or its relation with other isolated ones, generate predictions for the future. The reason for using island concept is that, there are lots of example of abundant land in urban matrix which have potential for promoting urban biodiversity (Fig. 3).

Figure 3: Abandoned urban area can be good connector and potential places between nature and human with good landscape design (Ankara-Original).

Generally, most of the remaining open spaces as islands in urban areas have similar characteristics with the natural area around the cities.

Therefore, they have potential to be considered as large patch and habitat for native biodiversity or as a connecting element of surrounding habitat fostering species diversity and ecosystem functions. Many researchers emphasized a landscape mosaic composed of linear elements to augment the connections of the otherwise isolated and often small urban habitats islands (Ahern, 1991, Flores et al., 1998 and Schrijnen, 2000).

As it is mentioned, there is a general agreement that cities are characterized by high species richness in terms of vascular plants and most animal groups. The large variety of habitats are present and varied in vertical and habitat structure, the considerable variation in the type and intensities of land use, the range of material used and the huge array of micro-habitants, and the most varied habitant mosaic configurations (Muller & Werner 2010).

As a result; landscape ecology principles can contribute urban green spaces as habitat which are suitable living areas for wildlife and biodiversity in built-up area. For example; Jim end Chen (2003) planned Nanjing City in China as a compact city and connected the urban green areas in regional scale using three landscape elements; green wedges, greenways and green extensions. Therefore, it is possible to plan the appropriate habitat for wildlife and biodiversity by organizing and connecting urban green areas with each other by applying landscape ecology principle.

INTERACTION BETWEEN LANDSCAPE ECOLOGY PRINCIPLES AND IMPROVING URBAN BIODIVERSITY

As it mentioned above, applying landscape ecology in urban planning and design is vital for assuring urban biodiversity. In addition, landscape ecology principles must be applying in maintenance and management of urban green areas. For this purpose, landscape planning strategies such as planning green infrastructure and planning based on storm water management are ecological strategies not only improve urban biodiversity but also support the functionality of urban ecological services.

Scale and characteristics of patches are important factors in considering the proper landscape planning and design. According to Angold et al. (2006), better understanding of the interplay between landscape and local factors that affect urban biological diversity is the first step for managing the urban environment. Therefore, identifying the existing biological diversity potential in each patches is an important issue. In addition, it is very importance to save large urban natural areas or remnant habitat as an effective matrix in urban constructed matrix.

It must be highlighted that in the case of urban biodiversity a small area is as valuable as large green areas in urban matrix. It is important that urban planners act both on the large scale including entire city as well as on the smaller scale including neighborhoods. For example, improper landscape design in a site which was located in Ankara not only destroyed the native vegetation of the area, but also threaten the functionality of ecological services such as flood regulation.Figure 4, 5 and 6 illustrated the changes in habitat form in 2005-2010-2015.

As it is illustrated in figure 4, eliminating natural vegetation and covering the surface with impermeable surface prevent the storm water to be conducted into the soil. As a result, most of the time flooding problems occurred in the area. Ignoring natural vegetation of this semi natural areas inside the urban matrix and covering the natural surface by constructional materials caused environmental problems. Therefore, even a minor intervention may cause irreversible issues.

Therefore, any remnant natural areas inside the city matrix is valuable for diversified wildlife. In addition, these areas provide proximate ecological educations opportunities compared to remote countryside locations.

Figure 4: The land cover of site before design process in 2005 (Ankara-Original).

Figure 5: The construction process of site, elimination of natural vegetation (Ankara-Original).

Besides the semi natural areas in city matrix, there are some abandoned industrial sites or unused lands which have been commonly claimed as semi- natural habitats by wildlife (Hough 1989, and Hough, 1994). Furthermore, some abandoned cemeteries (because of low impact human) can contribute important habitat for wildlife. Therefore, based on landscape ecology principles, these areas can be planned as a corridor connecting patches or function as a main patch. In this case, minor landscaping considerations such as planting natural vegetation can be effective for promoting biodiversity. Furthermore, these places can be effective as a place for interaction of urban residents with nature. For this purpose, landscape designing tools such as designing just path way, some sitting and relaxing areas can make these areas more functional from social and environmental point of view.

Figure 6: Result/ flooding area; the construction process of site, elimination of natural vegetation in 2015 (Ankara-Original).

As stated in previous section, there is a growth in urban population which cause the need for housing. Considering the urban ecosystem features and landscape ecology principle, new housing and urbanization program must be considering to promote urban biodiversity or support the remnant ones.

As it highlighted before, developing corridors and step stone are absolutely necessary for providing connection between the patches. Therefore, first the ecological function of each patch must examined and every opportunity should be evaluated for developing the connection among the patches (Fig. 7). For this purpose, as Niemela (1999), emphasized, 'green belts' surrounding cities and 'green corridors' running through cities are the effective strategies. Urban planners must determine the inventory of biological diversity resources within cities, and then organize these resources with unique structures and corridors.

Figure 7: Green roof and green wall as stepping stone between the patches (Original).

Urban development fragments the vegetated patches of urban area. Therefore, any opportunity for preventing fragmentation must be considered in urban matrix. For example, in built corridors such as railways, bridges and etc., landscape design solution can be utilized. For this aim, there are some design samples to accelerate the movement of animals between patches. For example, Amphibian tunnels in Germany or developing and installing turtle tunnels by West Japan Railway Company and the Suma Aqua life Park in Kobe are notable examples for supporting biodiversity using built corridors.

On the other hand, it is impossible to eliminate constructed areas for linking the patches. Therefore, it is necessary to add step stone between the patches to enhance movement of species between habitats for developing urban habitats or rehabilitate remnant ones. For this aim, balcony, roofs and green walls can be assignment as stepping stone in urban landscape. Therefore, scale in the case of step stone in not important and any opportunity must be considered for connection between habitats. For instance, a planted wall or facade could be effective for supporting urban biodiversity besides aesthetically enhancing the visual quality (Fig. 8).

Figure 8: A planted wall can be a shelter for animals in sunny or rainy days (Original).

Generally, the shape of the patches is defining by their borders. These borders can be designed by landscape architecture or urban planners to accomplish an ecological function or objectives. Due to the diverse significant of edges, rich opportunities exist to use this key ecological transition zone between two types of habitats in designs and plans. Therefore, edges must design in such a way that support more animal and vegetation diversity.

CONCLUSIONS

Despite the large amount of research on the concept of urban biodiversity and landscape ecology principle in literature; most of the theories cannot be applied in urban landscape planning and design processes by local authorities, designers and planners in many cases. The reason is that, there is still lack of awareness of importance of urban biodiversity or landscape ecological principles by urban managers.

The political and ideological reasons caused that the urban planning and design processes to be done without implementation and analyzes of unique ecosystem of urban area. Therefore, most of the implementations cause irreversible result in urban ecosystem as an ecological point of view.

The fact is that the resources of urban biodiversity are depleted as quickly as ever. Therefore, it is vital to have comprehensive method to evaluate the resources for enhancing urban biodiversity and ensuring the functionality of ecologic services in urban area. For this purpose, it is necessary to clarify the landscape ecological principles in urban area and make authorities to put these principles into practice in urban planning and design processes.

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Chapter 31

A Research on Accessibility of Urban Parks by Disabled Person: The Case Study of Birlik Park, Konya-Turkey

Sertaç GÜNGÖR*

INTRODUCTION

During the long historical time period, human has used a kind of ability to appreciate nature, to get the flavor of life and formed some psychological processes dependency on nature. This kind of feeling and perception through the realization of a better build and strengthen self-identification. In addition, these feelings reinforce mutual understanding and trust, strengthen the relationship with each other and may be responsible. All this really help to achieve self-worth. This is the most powerful reason why the communication in green area can never replace that in open public area. People begin to realize the crucial mechanism of urban green space system is to transform the active mechanic space into ideal state, i. e. form the value of environment mechanism, in relation to people's life (Bilgili ve Gökyer 2012:108)

Green spaces also help in reduction of the energy costs of cooling buildings effectively. Furthermore, due to their amenity and aesthetic, green spaces increase property value. However, the most sought benefits of green spaces in a city are the social and psychological benefits. Urban green spaces, especially public parks and gardens provide resources for relaxation and recreation. Ideally this helps in emotional healing (therapeutic) and physical relaxation. In order to meet social and psychological needs of citizens satisfactorily, green spaces in the city should be easily accessible and in adequately optimal in quality and quantity. Green spaces need to be uniformly distributed throughout the city area, and the total area occupied by green spaces in the city should be large enough to accommodate the city population needs (Bilgili ve Gökyer 2012:109)

Urban open-green areas are the kind of spaces in which people and society coexist, get socialized, members of divergent social classes and cultures exhibiting a range of characteristics can convene and interact (Yılmaz et al. 2014:2)

As is the case in the entire globe, one of the leading problems in Turkey is the unfavorable conditions of disabled people and their families. As being inseparable components of the community, disabled people have to cope with listless barriers in social life in which they are deemed to be passive people in need of constant care. For disabled people, this misconception is indeed an even more troubling problem than the physical barriers they already have to fight against (Bekci 2012:27).

Transportation, physical environment and housing are a few of the preliminary barriers preventing disabled people from integration with the society. The physical environment that disabled people cohabitate hold utmost importance due to the physical

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function deficiencies/lacks they exhibit and the resulting restrictions triggered by such deficiencies. In the process of community- designing and proposing a community model, it is essential to design the cohabitated physical environment by equally considering the needs of all its dwellers. It is an acknowledged fact that not all the environmental components, let it be the personal housing or public life spaces and transportation vehicles, have been designed in the best way to meet the needs and specific traits of disabled people. Roads, pavements, public buildings, parks and gardens, schools, residences, transportation vehicles and several other components in any given physical environment pose significant impediments to unite disabled people with the entire community. Hence the kind of limitation that is already forced onto a physically-immobile person is even further accelerated due to identical and similar reasons. What this means in reality is that a person with restricted mobility talent is cast out from the society. The truth is that all the factors listed above should initially have been designed and improved in the best ways to integrate and unite the disabled people with the entire community (Karataş 2002).

Prior to forming disabled-friendly designs in open-green areas and investigating disabled-friendly spaces applicable for their easy use, it is required to provide a comprehensive definition of the term “disability” (Özdingiş 2007:21).

There are many different views and definitions regarding handicap. In the notification published by World Health Organization (WHO) in 1980, the basic concepts regarding handicap have been defined and definitions have been given in three separate categories in this issue with a classification giving importance to the health dimension of handicap:

Impairment: It expresses the status of losing or aberration of the physiological, psychological and anatomical structure. This definition is especially used in the defects at organ level.

Disability: This definition expresses the physical and mental faculty loss. It is defined as the normally decrease or loss of a skill due to an impairment occurring as a result of the impairment of health.

Handicap: It means a person not being able to fulfill the life requirements accepted as normal according to his/her age, gender, social and cultural level due to the aforementioned impairment or disability situation (Gezen 2014).

Because the participation of the handicapped people to the social life within the scope of “Accessibility” is provided by bringing them together in certain areas, it is primarily necessary that the handicapped people should be able to make a move out of the places they live. Although the concepts of “availability” and “accessibility” are used instead of each other, the concept of accessibility is accepted as more comprehensive than the concept of availability due to the fact that the concept of accessibility has a scope wider than the physical availability. Again; the concept of “Accessibility” is preferred instead of the concept of “Availability” in the UN Contract Regarding the Rights of the Handicapped (Baş 2013:7).

The handicapped people could be separated into two classes as stemming from the handicap and stemming from other reasons. The handicap in the first group could be examined under six headlines according to the study of OZIDA 2002;

- Orthopedically (physically) handicapped
- Visually handicapped
- Hearing handicapped

• Language and speaking handicapped
• Mentally handicapped
• Chronic patient handicapped (Ören 2015:13)

Physically and visually disabled people also experience accessibility handicap against the physical handicaps. Those experiencing movement limitedness and having accessibility handicap except for the handicapped groups due to various reasons could be classified as follows;

• The old and children
• Those too tall or too short
• Obeses
• Temporary handicapped (pregnant, injured, patient)
• Those with baby carriage or those carrying loads (Ören 2015:13)

The first contract conceptualizing the accessibility with its widest meaning and arranging it with an independent provision is the UN Contract of the Handicapped Rights. One of eight principles of the UN Contract of Handicapped Rights is the Principle of Accessibility. In the article no. 9 of the Contract, it is explained that the accessibility should be provided for the handicapped to be able to exist in an equal way in all the areas of life without needing the help of anyone. With this article, they have brought the liability to provide the accessibility to the services such as buildings, roads, transportation vehicles, schools, houses, health facilities, workplaces, open and closed facilities, information and communication devices etc. for the handicapped by the state. Accessibility is a concept expressing to have the opportunities of being able to reach the economic, social and cultural environments, primarily the human-made and natural physical environment, and getting benefit and contributing to the services given in these environments. Accessibility for the handicapped is also a condition for being able to completely attend to all the areas of social life and live independently as well as being a tool for being able to make use of the rights. It is necessary that access should be provided for the handicapped to the physical environment, transportation, information and communication including the information and communication technologies, other facilities and services open for public in an equal way with other members of the society for them to be able to sustain a life convenient to the human honor independently (Ören 2015:18).

Reaching the place and being able to use the place have a significant importance in the participation of the handicapped to the social life. However; the handicapped individuals to sustain their lives under the same conditions with all other individuals will be provided with the planning, design and application of the structured environment in an accessible way for them (Sirel ve ark., 2012:53).

Because; the social life starts with being able to step outside the house for the handicapped people. The ladder steps, elevator cabinet, pavements, pedestrian crossings, transportation vehicles etc. turn into an impassable barriers for a handicapped person wishing to get out of his/her house (Erdem, 2007:113).

The design of the open areas in an ergonomical and detailed way lies behind the basis of the solution of this problem. It is necessary that the designs and applications in the urban open areas should be formed in accordance with the standards of the handicapped individuals for the purpose of forming an accessibly structured environment (ÖZİDA, 2010).

MATERIAL AND METHOD

Material: Research site of this study, Birlik Park, is 14km. distant from the city center and located nearby Konya Civil Airport. As a part of the context within Ankara beltway landscape designs, “Birlik Park” was opened to service in year 2006. By virtue of its ordered structuring and peaceful atmosphere, this park offers a piece of rest to those intercity travelers in particular and also provides an alternative field for sports and recreation means for urban dwellers. Birlik Park; with its 105.000 m² green area, and 130.000 m² of total area is among the most popular recreation spots of Konya thanks to its cascade, playgrounds for kids and alluring plant tissues.

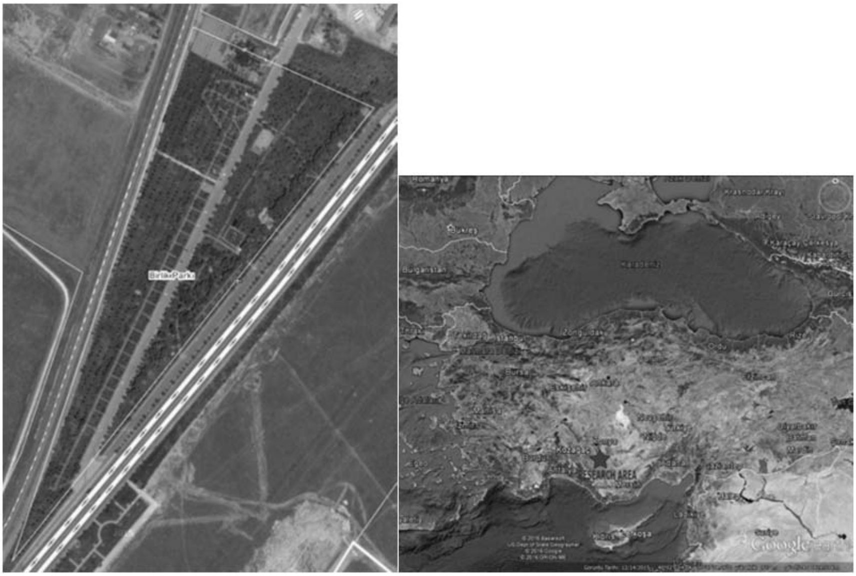

Figure 1: Location map and Satellite view of the research area (Anonymous 2016).

The material of the study consists of the sheets and data belonging to the study area, the studies previously conducted in the subject and in the study area attained by means of conducting a literature review regarding the issue, in addition, national and international design standards published for being able to realize the designs in convenience to the handicapped individuals in the physical design.

Method: The measurements and locations of the design elements that may respond to the needs of the handicapped individuals and that take place within Birlik Park (entrances, pavements, pedestrian crossings, parking lots, ladders, urban furniture etc.) have been determined via in situ measurement. These elements have been drawn, their photos have been taken and the existent physical properties have been detected.

The study method mainly consists of three stages. These stages are given as follows;

Literature review and data collection: At this stage, the publications regarding the parks and accessibility within the scope of our research subject have been examined.

Study area and existent status detection (Findings): The necessary information regarding Birlik Park has been taken from Konya Metropolitan Municipality, the park has been observed in summer and the landscape design has been examined according to the handicapped and old individual criteria. In addition; the comments of the handicapped park users and their companions regarding the problems they face with the use of the park have been taken and assessments have been supported with the photos taken in there.

General assessment-making suggestions: The landscape architecture in the study area has been examined in terms of the design criteria and handicapped individuals and suggestions have been made.

3. FINDINGS

In the research site, there are 125 picnic tables, 68 camellia, 1 small mosque, 2576 trees and decoration plants (except for bushes), 34 large bins, 82 small bins, 5 pools, 2 fountains, 3 playgrounds, 1 group of (12 units) fitness set, 1 WC (14 cabin), a disabled WC cabin exclusive for the disabled visitors, a climbing net, a trampoline and similar play tools, 1 buffet, 1 administrative building, 1 depot, solar-powered and normal lightning components.

3.1. Park Entrances

There are 2 park entrance gates in different directions. In both park entrance gates of the area, there is a car-park and pedestrian roads as well as ramps for the use of disabled visitors.

3.2. Walking Trails and Ramps

The widths of walking trails inside the Park are not fixed but vary between 80 cm to 205 cm. As stipulated under TS 12576, to enable all pedestrians to move freely, pavements should be minimum 150 cm. According to Prime Minister's Directorate of the Office for Disabled People, the ideal distance is 200 cm (Olgun 2014:53).

As stated under UN (2004) the distance required for two wheel chairs to come across concurrently is 150 cm. On the basis of the standards aforementioned, it is safe to argue that certain walking trails inside Birlik Park can meet the expectations whereas certain trails are not applicable to meet the needs of disabled users.

Figure 2: A view from the Park entrance (Original 2016).

Figure 3: Park entrance on the main road (Original 2016).

Figure 4: Park sign on the entrance gate (Original 2016).


Figure 5: Bus stop on the park entrance gate (Original 2016).


Figure 6: Walkway and benches (Original 2016).

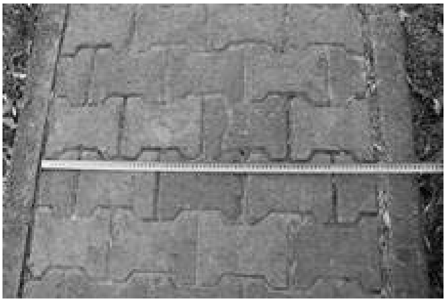
Figure 7: 80 cm wide walkway (Original 2016).


Figure 8: Pontoon mounted on the entrance of walking trail (Original 2016).


Figure 9: Pontoon mounted on the intersection of two walking trails (Original 2016).

Another negative aspect related to the area is fixed pontoons that are situated in the center of walking trails widely located nearby the playgrounds and used in the access of automobiles. They are wide enough to let the passage of 4 wheel chairs inside the park. Although these pontoons were situated to ensure the safety of kids' playgrounds in practice, it indeed lowered the quantity of already-limited number of trails wide enough for wheel chair use thereby further impeding the functioning of physically-disabled users.

Figure 10: Disabled ramp allowing the entrance to the Park (Original 2016).

Figure 11: Disabled ramp before the buffet (Original 2016).

Figure 12: The maximum recommended slope of ramps is 1:20. (http://www.bd.gov.hk/english/documents/code/bfa2008/Division5.pdf)

3.3. Car-park

As regulated by 01.07.1993-dated 21624 no decree published in official gazette, in the closest distance to the entrance and exit points of public buildings and regional car-parks and general car-parks as well as the lifts, minimum 1 car park space among consecutive 20 cars must be reserved for the use of disabled drivers and be signaled via an appropriate sign (Anon., 2008).

There is a car park in the 2 entrance gates of our research site. Car-park sizes have been measured as 2.5m - 4.5m. Nevertheless, to enable wheel chair users' free movement, sizes of car park must vary between 3.6m - 6m (see image 18). There must be a minimum 1.2 m size distance for mobility on one right or left side and rear side of the car-park.

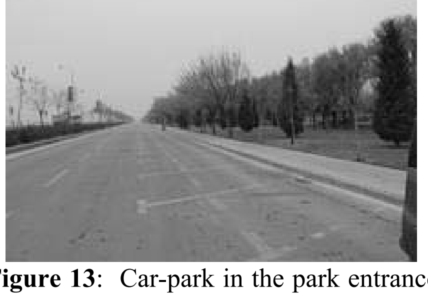

Figure 13: Car-park in the park entrance (Original 2016).

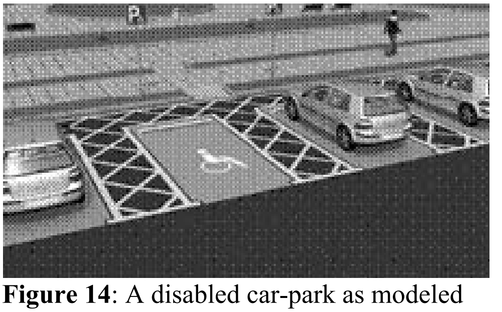

Figure 14: A disabled car-park as modeled (http://www.scalamat.com/wp-content/uploads/Engelli-Otoparkı.png)

Inside the park area there is not a disabled car-park for disabled people only nor there a directory sign to orient disabled visitors.

3.4. Seating Components

In the detailing process of outer space seating units, it is mostly ignored whether these equipment’s are disabled-friendly or not. However the common desire among wheel chair users is to enjoy spaces in which they can relax or get socialized. In urban outer spaces there must be seating points alongside the road and must be adjacent to pedestrian trails and still-soil areas. On the next side of seating points there must decisively be a 120 cm distance area wide enough for the easy approach of wheel chair user. In picnic and playground zones as well, table and seating points must be arranged in the appropriate height for knee distance to facilitate wheel chair users' comfort (Koca 2010, p. 18). Seating components in the research site are basically camellia systems arranged for the picnic groups. Even if we exempted the ones with no access from walking trails, on no accounts could wheel chair users access these camellias and involve in any recreational activity.

Figure 15: Sizes of seating components in the Park (Seat size: 77 cm x 40cm. Back size: 30 cm) (Original 2016).

Figure 16: Seating component in the playground (Original 2016).

As stipulated under the data of ÖZİDA-Administration for Disabled People-(2010) a bank's height from the ground level must be of 45 cm and the height of back sitting support must be of 70 cm. Height of the tables in rest area must vary between 75 cm to 90 cm and in order for the wheel chair to approach from all sides, the minimum depth below the table must be of 60 cm (ÖZİDA 2010, publication no: 49)

With respect to ergonomic criteria, seating components in the park are not favorable for the use of disabled people. Since grab rails, single-direction mobility freedom and height of seating component are not appropriate; a wheel chair user can independently use such seating components under no circumstances. Additionally, in rest areas, there is not a 120 cm-distance area allowing the wheel chairs to approach the seating component.

3.5. WC - Sinks

In the commonly shared areas within outer space, it is regulated that minimum 2 toilets (men-women) for the disabled users are available. A sign for the disabled must be put on the toilet door to inform about the presence of this toilet.

Doors of the toilet must be opened outwardly and door key must be located in a way to be opened from outside. Inner width of the toilet must be arranged in the most favorable way to enable a feasible rotation distance for the users of wheel chair (Koca 2010:18).

Toilets must be arranged on the basis of the needs of wheel chair users. There are national regulations for structures to determine the design standards in disabled toilets, but a set of common requirements must be met in general-use areas:

A wide and easily open able door (minimum width 925 mm),

Sufficient space in the cabin for the free mobility of wheel chair users,

Sufficient space for the wheel chair users to enter the toilet in front of or nearby the wheel chair,

Hand washing and drying units accessible from the toilet,

There must be sufficient free space to enable wheel chair user to approach the closet or his/her wheel chair.

The size of toilet cabin is determined by the central or corner position of the closet. Toilets with a central closet allow the user to reach the closet from front and back directions or from the left direction and they must have 2800 mm width and 2200 mm length.

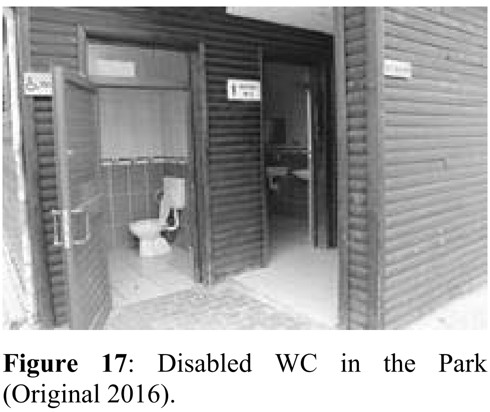

Figure 17: Disabled WC in the Park (Original 2016).

Figure 18: A toilet exclusively designed for the disabled people

http://www.grab-rails.com/docmlayout.jpg)

Corner closets are suitable only for the access from the right or left direction thereby forcing a smaller space such as 1500 mm width and 2200 mm length. Closet height must be of 480 mm and on the access points to the closet there must be rigidly-fixated grab rails.

Sink must be 720 – 740 mm (maximum 800 mm) above the ground and hand drying machines and soap dispensers must be around 850 mm height.

Inside all the toilets there must be an emergency call or assistance call button easily accessible and operable. As a rule of thumb, disabled toilets must be as widespread as normal toilets (Koca 2010:18).

WC - sink in the research site is locationally separated from normal WC; but in terms of usage criteria, they are not much favorable for disabled people use. Based on the criteria for design and vet area fittings, a locationally-separated WC for the disabled people is decisively not truly separated from normal WC.

There are no disabled-friendly closets or grab rails that assist the person in moving independently or emergency / assistance call buttons which collectively limit the operability of the space. The sink inside the space is not favorable for the easy approach of wheel-chair users either.

In the Park it is not a problem to access WC of which overall size is appropriate for easy maneuver of the wheel chair. Nevertheless the key slot that allows locking from the inside is too high for a disabled person to reach and offers no alternative way to be opened from outside either.

3.6. Playgrounds

Playgrounds in the Park are not disabled friendly in terms of accessibility or operability. There are virtually no places for disabled people to socialize and unite with nondisabled people.

The most significant feature of play grounds is that they are the kind of places in which kids can spend a shared time and fun activities. However, with respect to urban fittings or accessibility, playgrounds in Birlik Park are not friendly for physically disabled kids. The ground surface of playgrounds is composed of gravels and intermittent stones. Furthermore none of the playground fittings is friendly for physically-disabled kids.

Figure 19: Play tools in the Park (Original 2016).

Figure 20: Climbing game tool in the Park (Original 2016).

Figure 21: Kids playground (Original 2016).

Figure 22: Hammock tool for kids (Original 2016).

Irrespective of the fact that there are listless numbers of national and global designs serving to this particular purpose, virtually none of them is available in Birlik Park.

3.7. Lightning Components

In potentially dangerous zones such as ramps and staircase entries particularly, lightning is critically significant to ensure the safety of disabled people. Lightning must be planned by using immobile components via prioritizing the needs of disabled people. For people with optical deformities, an increase in the power of lightning would offer help to better perceive the spaces.

Quite a high number of lightning standards have been determined on the eye level of a standing person. Eye level of wheel chair users is circa 1.19 m.

Urban outer spaces must be sufficiently lightened for easy access and personal safety. Here, against flashing/reflection, opaque materials must be selected and the power of lightning must be increased in dangerous zones (Koca 2010:17).

As regards the height of lightning component; in parks & gardens maximum height of low-lightning components must be 100 cm, maximum height of high lightning components must be 240 cm (Karatay 2009:138).

As specified in TS 12576, the distance for head protection must be above 220 cm (TSE 1999).

In Konya Birlik Park 2 types of lightning components with different heights have been mounted in different locations. The height of all lightning components is above 220 cm, which is the head protection distance.

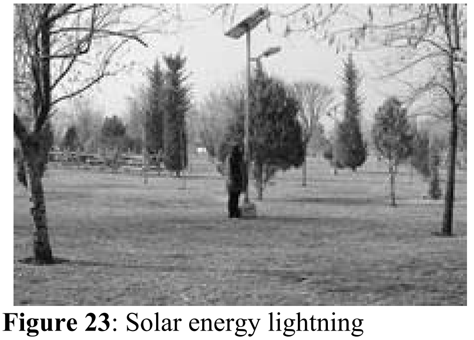

Figure 23: Solar energy lightning component in the Park (Original 2016).

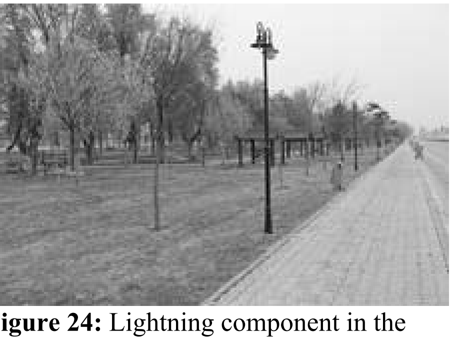

Figure 24: Lightning component in the Park (Original 2016).

3.8. Bins

Bins must not block the mobility of pedestrians; hence on the edge of sidewalk bins must be minimum 40 cm away from the curbstone and must be located in a distance that can be paved from walking route. They must be located in a way that minimum height would be 90 cm; maximum height would be 120 cm.

Misplaced bins are potential threats for disabled pedestrians. To take counter measures against this danger, just as is the case for the rest of fitting components, bins must also be signaled by contrast colors to become more visible and easily perceivable.

Within that context it can be suggested that bins should be mounted via considering appropriate height levels for lightning poles (Koca 2010:17).

Bins must be structured by a safe material against potential injuries and should also be operable with one hand only (Ministry of Health, Turkish Public Health

Directorate 2012).

Bins located inside Birlik Park are not within the borders of walking trail. On one side of the trail it is connected to the walking trail via a concrete pocket; hence it is in an accessible distance for the wheel chair user by arm.

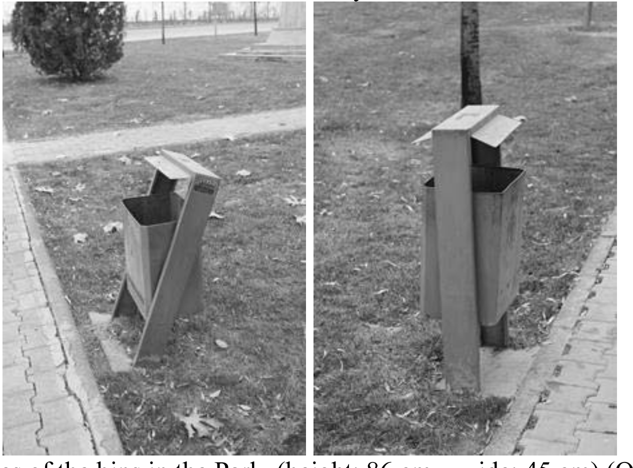

Figure 25: Sizes of the bins in the Park (height: 86 cm x wide: 45 cm) (Original 2016).

3.9. Fountain

Considering the fact that wheel chair users might also like to use this fitting, there must be sufficient free space around the fountain to allow the wheel chair users to move safely and single-handedly and the height of the fountain must be arranged in an appropriate distance for disabled people’s easy access by sitting or leaning forward.

Accordingly details of the design that is correct with respect to accessibility criteria for fountains are as indicated below;

Figure 26: Sizes of the fountain in the Park (Original 2016)

Figure 27: A differently designed fountain in the Park (Original 2016).

Fountain mouth should be set onto an approximately 90 cm height.

It is more appropriate for fountains to have two mouths in different sizes.

For wheel-chair users it must be of 85 cm height and to enable people with other disabilities to use by leaning forward, it must be of 95 cm height (Koca 2010:17).

In the research site there are three fountains in dissimilar designs but none of the three fountains is favorable for the use of disabled people.

In stark contrast to the fountains designed in Turkey and the globe for disabled users, the fountains in this park are far from meeting the needs of disabled people neither functionally nor massively.

3.10. Telephone Booth

Telephones decisively constitute tremendous problems for physically disabled people. Minimum one public telephone must be favorable for wheel chair users. It is deemed that non-cabin telephones are much better for disabled people use.

In a telephone cabin the width of the door must be minimum 90 cm. Interior dimensions of the cabin must be at appropriate sizes for the entrance and exit of wheel chair and min. 120x125 cm height must be considered for disabled users' comfortable access and maximum height must not exceed 130 cm (Özdingiş 2007, p. 82).

In Birlik Park there is one telephone booth which is not favorable for the use of disabled people. Although there is virtually no problem in terms of access due to height it is infeasible for disabled people to reach the receiver and card slot.

3.11. Plant arrangement

In the parks and open-green areas plants are used for aesthetical and functional purposes. Hence, by following certain rules in selecting, planting and tending, the vegetation plants can lead their existence without posing any danger or threat to the physical environment (Özdingiş 2007:94). Sight-disabled people can make the best of a diligently designed plantation. Plantation designs exhibiting stark contrasts and eye-catching silhouettes can function as visual signals for partially- sight impaired people. Broken branches on the walking trails after the heavy rains, fallen leaves, slippery grounds and pollutant species, thorns, toxic and slipping fruits can pose danger while walking on the trails; therefore particular care must be paid under such conditions. Since thorny plants and seeds and fruit shedding trees and plants that would eventually create a slippery ground must at all times be removed from pedestrian walking trails due to their danger potential. Branches that extend to pedestrian trails constitute hazardous threat for sight-disabled people. Branches must not block pedestrian trails. They must either be planted in an appropriate distance away from pedestrian pass or be properly maintained, pruned and tended so as not to pose any danger for the walkers. In plantation it is also a significant matter to select briers, shrubs and flowers that would offer a rich assortment of colors, tissues and fragrances (Koca 2010:16).

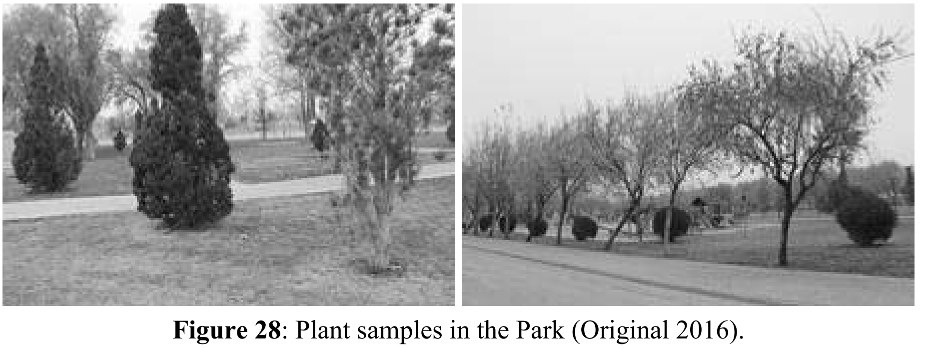

Figure 28: Plant samples in the Park (Original 2016).

Alongside the walking trails in Konya Birlik Park there are different tree forms as evergreen plants and deciduous plants. These plants are in the sufficient distance away from the road. Identically, plant branches extending to the borders of walking trail could also be a potential danger for physically -disabled visitors. Besides, those plants alongside the road have not been separated from the green areas which is another negative aspect for the easy use of sight disabled citizens.

4. CONCLUSION and SUGGESTIONS

Defined as people who have, due to injuries & physical or mental disorders & limited mobility and limited senses and/or functions; disabled people are widely ostracized from the community. For the last years quite a large number of studies have been conducted to simplify disabled people' lives. In a number of places such as schools, parks, recreational areas and several others, it has been a requirement to install essential fittings that would ease disabled life. Disabled people should feel themselves free in their community and get socialized under the same conditions with nondisabled people.

Studies conducted in Konya Birlik Park revealed that;

Although some of walking trails in this Park are wide enough to allow the passage of a wheel chair, some trails are too narrow for a wheel chair to pass across.

The slope of ramps in this Park is above the standard value. In all the ramps and all walking trails keystone has been used, but this material is indeed not suitable for wheel chair users. The kind of material used in ramps must possess the quality of weather condition resistance once exposed to less amount of duty cycle air.

Seating components in the Park are not sufficient for the easy access and use of wheel chair. It is virtually infeasible to access a number of seating components. Also it is suggested to design walking trails to allow disabled people' access.

In the Park there is a special WC-sink for disabled people. However in terms of design they are not different from normal WC-sink in any given way. It is thus suggested to use designs exclusively-manufactured to meet disabled people' needs. In that way, disabled people would also benefit from the same service as normal people do.

In the playgrounds located within the Park there are not any play components exclusively designed for disabled people, disabled kids in particular. The truth is that kids must be the priority in such areas, they should mingle with nondisabled kids in the very same environment, and not feel ostracized. A large number of play components designed for the use of disabled people must entail the other fittings to integrate the playground.

In this Park there are 3 fountains with dissimilar designs but none can meet the requirements for disabled-friendly use. In Turkey and all over the globe there are exclusively designed fountains for the use of disabled people, hence these designs must be actively employed in urban parks because it should be noted that all these beauties are the human needs of disabled people too.

Pay telephone in the Park is not comfortable for disabled people use. There are exclusively designed telephone booths for disabled people. To ensure that they can use these phones independently, such designs must be spread to all the other urban areas in addition to city parks.

Car-park in the Park entrance point can meet the needs in terms of general use but still they are not much favorable for the use of disabled people because in disabled car-parks per-car size for a car is higher than the standard value since maneuver space of the wheel chair user must also be added to the total area.

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Chapter 32

Ecological Approach to Rural Development

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1. INTRODUCTION

Rural areas are areas that aren't a part of urban areas that span widely across Earth, and according to a population projection performed by the United Nations (UN) in 2015 they are predicted to harbor 46.1 percent of the world's population (TOBB, 2013). Rural areas are areas that can be considered physically and socio-culturally disadvantageous in comparison to urban areas. Natural conditions that make life harder in rural areas are also usually the cause of delays in societal development. If we were to consider rural Turkey, it's easy to tell that natural conditions restrict the infrastructural development of important human necessities especially including transportation, education, welfare, and others. These negative impacts trigger emigration, one of the most important social problems of rural areas. People generally choose to live in cities with a higher standard of living and easier access to all sorts of services rather than live a difficult, lower standard rural life. Rural areas that have high amounts of emigration become inert over time.

There are a number of ongoing projects in order to prevent these negative impacts. The main goal of these projects is economic development and is based on an initiative to use the region's own resources, with the help of foreign aid, to turn a profit. In line with this objective, all kinds of natural resources can become a tool for economic gain.

While progressive steps that are unwittingly taken may have a positive perception from an economic standpoint, looking at them from an ecological point of view does not give that same sensation. Particularly in rural areas whose economies are built on the foundation of agriculture and forestry; increases in production, increases in incomes, creation of new career fields, and increases in worker capacities are all important steps in order to ensure economic development.

The most important point that must be taken into account while taking these steps is: to conform to the natural and cultural environment. Because not every piece of land on Earth has the same ecological properties; not every agricultural produce can be planted in all types of terrain, the same techniques cannot be implemented on all types of terrain, nor can the same yield be expected therefore the same income be expected. At this point, an appropriation of planning that utilizes the cohesion of ecological properties with its sector is required.

Setting up economic development plans with an ecological approach is important in regards to the future of exhaustible natural resources. An approach to development without a consideration for the ecological structure would lead to irreversible losses.

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In this project, it starts by explaining the terms "rural areas" and "rural development" and evaluates Turkey's and the European Union's (EU) rural development policies. This project emphasizes the importance of an ecologic approach in rural development policies. As an end result to this project, proposals have been developed that have to do with ecological principles that should appear in the policies.

1. 1. The Terms Rural Area and Rural Development

The Organization for Economic Co-operation and Development (OECD) defines rural areas according to the measure of its population density and accepts any land that has a population density of 150 people per square km as a rural area. According to this definition the OECD separates the areas into three groups:

- Regions in which 14% or less of its population live in rural areas: Urban dominant regions,
- Regions in which 15-50% of its population live in rural areas: Rural regions to a considerable extent,
- Regions in which 50% or more of its population live in rural areas: Rural dominant regions (OECD, 2011).

In the 2007-2013 National Rural Development Strategy; rural areas are stated as being the areas that, apart from urban settlements, have a population of 20.000 or more (DPT, 2006a). Turhan (2005) defines rural areas as spaces that have a low population density, which have an economy that relies more on agriculture, in which natural conditions and traditional values actively have an effect on how people live, that have structural deficiencies that are in interaction with the city and provide recreational opportunities for the cities.

Due of reasons such as their natural and cultural properties, their geographical locations, their place in the national economy, and their closeness with urban powers; rural areas have different types and different levels of constraints and developmental dynamics (Demirel, 2009). Rural areas present a structure that not only facilitates an area for the production of branded products that provide economic inputs, but are also rich in terms of biodiversity and can take a key role in the development of tourism (Giannini, 2013). The basic functions of rural areas can be considered as; areas for food production, a foundation for village crafts and industries, a settlement area for people that operate in agricultural and economic branches, a recreational area for people in cities and industrial settlements (Koç & Şahin, 2009).

According to Bakırcı (2007); the fact that a large portion of the planets population lives in rural areas, that the planets natural resources are affected by this and the problems stem from this means that rural development is necessary.

Rural development is the collective activities that predicates itself on the use of renewable natural resources in rural areas and works towards not only the increase of the income level and standard of living in rural areas, but also works to protect and improve environmental and cultural values (DPT, 2006b). If we were to consider a more broad definition, we can see that the descriptions from Geray (1965) and the Ministry of Food, Agriculture, and Livestock (GTHB, 2004) are far more detailed. In these definitions, rural communities are stated as communities that earn a living from agriculture and similar sectors and, with regards to its competitiveness with urban areas, are at a low level of economic, socio-cultural, and standard of living conditions. The most important point of these definitions is that these communities are in need of development and have to put effort towards change in accordance with this awareness. This point defines the process of economic and socio-cultural change that begins with the combining of efforts from the community along with moral and material aid from the government as rural development.

According to Geray (2011), rural development is stated as the developmental actions taken by people living in rural areas to change the community's social, economic, and ethical structures or status. The developmental actions that are stated here are activities that include: an increase in income or the level of wealth, balancing the relationship between man and land, an improvement in both physical and socio-cultural infrastructure. Rural development is the whole of the activities that take territorial dynamics, needs, and potentials into account with multisectorial plans. The basic parts of this whole are; the use of renewable resources, the increase of the level of income and standard of living in rural areas, the reduction in the difference of development between rural and urban areas, and the protection and improvement of environmental and cultural values (DPT, 2006b).

When looking at the history of rural development around the world, the use of modern agricultural techniques can be seen to start being used in the 1950s and 1960s. In the 1970s that followed, nations had come to a single structure for effective use of rural areas and especially for the agricultural sector. When the 1980s and 1990s came around, the participatory rural development approach that is prevalent in modern-day had started to be developed. As for the period that ranged from the early 2000's to modern-day, approaches that composed of multidimensional policies regarding rural development came to prominence (GTHB, 2004).

In the participatory strategic development planning approach that had been adopted from the 1980s onwards; instead of a top-down understanding, a bottom up understanding is prevalent (GTHB, 2004). This understanding became a means for positions that take into account the needs of and care for its community to take the place of enforcing positions in developmental trends. The main issue of approaches that don't use participation as its foundation in the planning process of developmental programs is that they don't consult the people that live in the rural areas and will be the ones affected by the negative impacts and don't give them an active role in the planning (Özer, 2004). According to Bollukcu & Açıksöz (2013); during the transmission of the upper scale developmental plan to the local level, the natural and cultural properties regarding the region needs to be considered altogether and an approach to assimilate the local residents into the developmental process, therefore creating a participatory planning and administrative approach is required.

It especially predicates on the approach of developed countries on rural development and its continued use. As for the less developed and developing countries, its approach is based on employment and the increase of income (Bakırcı, 2007). In comparison to many income-generating sectors; sectors that are indigenous to rural areas such as agriculture, livestock, arts and crafts, and forestry bring less income and require more physical strength. Along with infrastructural deficiencies that make conditions of living more difficult for people living in the countryside; reasons such as insufficient amount of agricultural lands not enough for the necessities of the population, a surplus of labor force in rural areas that stems from the rapid automation of agriculture, and the poverty that's connected to this all start creating emigration problems. As for the increase in emigration; as the rural areas turn inert, the urban areas also face various cultural, economic, social, and structural issues (GTHB, 2003). By insuring the prolonged use of rural areas and an improvement in the standard of living in rural lands, rural development will be effective in repairing the unbalanced rural-urban relationship.

In order for the developmental projects that are performed in rural areas to reach the intended outcomes, they need to be conducted according to certain principles: rural development projects should be developed slowly and gradually. The needs of the local community should be prioritized. Democratic means should be used. It should be in accordance with the region's cultural structure and values. It should benefit from local leaders and corporate structures. Disadvantaged groups (women, children, landless, etc.) should be allocated additional land**.** Local organizations should be given priority. It should be sustainable (Gülçubuk, 1997).

Ecologically based development approaches that include the objectives of environmental resource protection and passing on to future generations that have been adopted in the modern-day integrates with the concept of sustainable development. Sustainable development is a development approach that provides an effective use of natural resources by emphasizing environmental quality that tackles economic growth along with ecological equilibrium. According to the Brundtland Report, sustainable development is not only an economic development adaptable to the environment that protects the current resources so that future generations can also use them, but also is a balanced spatial development. Also for spatial development, the assessment of the ecological and cultural functions of the space is necessary along with the social and economic demands (ESPD, 1999; Gürlük, 2001).

For sustainable rural development to be achieved, the following subjects must be focused on: An understanding of conservation based on agriculture, forestry, and a rural ecosystem; agricultural risk management; a capacity to compete between sectors; ensuring the food chain; a transfer of information; a reduction in environmental pollution; participation; and the reduction of poverty (EC, 2011).

1.2. The General Framework of Rural Development Policies in the EU and in Turkey

The basis of Rural Development Policies in the EU is founded on policies and strategies that aim to eliminate the imbalance that consists between rural and urban regions. Rather than directly applying rural development projects, the EU instead shows support by transmitting funds to local projects. With its indirect intervention methods, the EU chooses to take into consideration the priorities of region and chooses project based approaches. When looking at the rural development objectives of the EU policies, 3 main headers can be seen. These objectives are: the development and empowerment of the main economic sectors of rural areas, agriculture and forestry; an increase in competitive power in rural areas; and the conservation of rural heritage. Rather than increasing agricultural production, the EU and its members have stated that they have taken a principle to increase nonagricultural production instead. It's stated that the decisions to increase agricultural operations in these countries are only adopted when there is a comparative supremacy among the products selected in that area (ESPD, 1999; Çelik, 2006; Çubuk, 2013).

The EU's general rural development strategies for the years 2014-2020 coincide also with their base plan. These plans consist of: Incentivizing investment into rural enterprise, increasing employment and competition, supporting ecofriendly agricultural practices and the investments into renewable energy to ensure the sustainable management of natural resources, and ensuring balanced regional development by developing rural economies and communities (EC, 2014). There is a concern within the context of the EU rural development operations regarding how the misuse of land and agricultural practices can lead to negative effects such as soil-water pollution, habitat fragmentation, and a decrease of native of wild animals in the natural environment. With this in mind, the Common Agricultural Policy (CAP) was founded in order to protect and enhance the rural heritage. According to this, it focuses on the subjects; natural agriculture, the enhancement of traditional agricultural landscapes and forestry systems, the protection of biodiversity, and management of water and climate change (EC, 2016). Regarding the EU rural development approaches, it can be said that a principle of sustainability being prominent, predictability of risks to damaging natural and cultural heritages, and an ecological viewpoint are dominant in the EU rural development approaches.

It can be said that the rural development projects in Turkey started after the establishment of the republic. During this period agriculture was determined as the key sector for ensuring economic development in rural areas. The developmental projects for rural areas that had commenced with the introduction of the First Economics Congress and Village law gathered momentum with the abolishment of tithe and initiatives regarding land and deeds. One of the most important initiatives of the time period was the Village Institute that was founded with the vision that development could be achieved through education. These projects were important rural development initiatives that were effective until the planning era (GTHB, 2004; Çakar, 2007; Geray, 2011).

Turkey had gone into a more ordinate and planned development period where goals were introduced alongside plans with the planning era. In this context, a five year development plan had begun to be produced beginning from the year 1963. The five year development plans were made by embracing various development models and planning approaches such as: community development, the planning of versatile rural areas, urban-type village, agricultural city, central village, model village, and the homecoming to the village model. One of the important steps in the planning era is the rural development project. The most important reason why the development projects had not reached the intended level of success is (Gürlük, 2001); that the issues in rural areas were not fully understood and that a mentality of disorderly, unplanned, and asynchronous labor is prevalent.

The subject of rural development did not directly exist before Five Year Development Plan VIII of the development plans. The subject took place in the development plans under the headers of: rural development, community development, issues of village and villager, regions that take development priority, regional progression, and village development.

When looking at the I, II, III, and IV five year development plans; objectives focused on credit facility, marketing facilitation, and becoming a cooperative and; especially in plan IV; an emphasis on industrialization can be seen (DPT, 1963; DPT, 1967; DPT, 1972; DPT, 1979). The concept of integrated rural development projects and regions that take development priority were put forward in the V, VI, and VII five year development plans. This aimed to reduce the disparity of advancement between regions to a minimum. It also aimed to strengthen nonagricultural economic branches of activity, create training programs regarding rural areas, and increase the widespread of health services during the periods of this plan (DPT, 1984; DPT, 1989; DPT, 1995). In accordance with the EU, rural development objectives with similar objectives to the EU rural development plans can be seen in the VII, IX, X five year development plans (DPT, 2000; DPT, 2006b; DPT, 2013). However the main problem in Turkey had to do with the application of the set objectives. It can be said that the rural development policies that were adopted in Turkey generally had similar properties to the development plans that were made. The plans mostly focused on the improvement of the economic structure and fixing infrastructural problems. Despite the fact that a good part of these infrastructural problems have been fixed in this modern-day, economic improvement has not been fully reached. Today, economic issues in Turkey's countryside still persist and emigration comes along with these issues, which is an important societal issue. Plans that include the participation of the community and take the local priorities into consideration have yet to be implemented.

2. MATERIAL METHOD

In this project that takes the ecological aspect of the subject, rural development, first the terms “rural area” and “rural development” are explained. Because of Turkey's status of being in a period of orientation with the EU, both Turkey's and the EU's rural development policies are evaluated. In this context, the "Common Agricultural Policy", "Agricultural Fund and Rural Development", and "The European Spatial Development Perspective" that have been prepared by the EU commission along with Turkey's I-X, Five Year Development Plan and Nation Rural Development Strategy have been evaluated in regard to their ecological approaches.

As a result of this project that emphasizes the importance of ecological approaches to rural development policies, proposals have been developed that have to do with ecological principles that should appear in the policies.

3. RESULTS

Despite being assumed as being one and the same as economic development, rural areas developing to a high enough level to compete with urban areas is not the only thing necessary. Development plans in areas in which its natural resources become endlessly exhausted without conservation will be badly influenced in the long term and not produce the expected output. Development is a subject that has to do with both today and the future.

Developed countries structure the countermeasures that they take against the exhaustion of natural resources required in meeting the needs of their limitless human needs within the scope of sustainable development projects (Gürlük, 2001). In the last development plan, the principal of sustainability comes to the forefront and the start of the adoption of sustainable approaches to natural resource use and management can be seen along with this. The National Rural Development Strategy is an important document regarding this subject.

In the National Rural Development Strategy, the concept of sustainability has been addressed in regards to its economic, social, and environmental aspects. It's necessary for economic operations to monitor its effects on the environment, natural resources, and historical and cultural entities along with working alongside corporations to prevent negative outcomes. The benefit of natural resources and the effort to turn these resources into economical value leads way to the wearing out of the natural environment. Problems such as erosion, desiccation, drought, forest fires, floods, landslides, and the loss of biodiversity arise due to the damaging of water and soil sources, the misuse of land, and agronomic practices. The strategies that have been created for the purpose of preserving and strengthening the rural environment are: The development of environment friendly agricultural practices, protecting the forest ecosystem and ensuring its sustainable use, and the management and improvement of protected areas. With regards to the sustainability of rural economic sectors; the protection of the natural and cultural structure and the assurance of public participation are essential (DPT, 2006a).

It's especially important to be careful concerning the subjects of: The increasing of soil fertility and prevention of soil loss, preventing the senseless exhaustion of forests, and the proper preservation of natural resources in rural development projects (Çubuk, 2013). The senseless use of soil and water sources, forests, and pastures poses a serious threat to their existence. Alongside global warming, at the helm of these threats are natural disasters such as erosion and landslides that cause the loss of fertile agricultural soil (Tartıcı, 2013).

While policies are being prepared in development projects, it's necessary for an understanding to be adopted that accepts that each and every land has different properties from one another (ESPD, 1999). Every region's problems and potentials are different. The same method of intervention cannot be applied everywhere. This is why it's logical for an approach to be put forth that takes local priorities into account.

Rural areas are an important resource that feeds and provides food to the cities with its existing sectors. Ever shortsighted step taken first affects the rural areas, then affects the cities. In this context it is necessary to not only support sustainable rural development efforts, but also prevent environmental problems that arise from the rural sectors (Bakırcı, 2007; UN, 2016).

Rural areas hold important tourism and recreational areas with their natural and cultural riches. Rural areas are areas that stand out with their biodiversity. A large portion of protected areas also contain rural areas. According to IUCN's definition, protected areas are terrestrial and/or maritime areas that are governed by legal or more effective management measures that serve to ensure the continuity and preservation of specifically biological diversity, and natural and cultural resources (DKMP, 2016).

It is necessary to prepare a detailed inventory of natural resources and ensure the participation of the community in order to guarantee the rational planning and sustainable use of natural resources (Açıksöz, Topay & Yılmaz, 2008). With regards to natural resources, the specification of areas of importance and the supervision and control of every possible operation with active control mechanisms are the primary precautions that can be taken to prevent potential negative impacts on the ecological structure. In addition to this, the precautions to eliminate possible negative impacts that the rural economic sectors (agriculture, forestry, and tourism) could erect are written below for each and every sector.

Agricultural production includes vegetative and animal production activities. Soil and water sources are the most important ecological structures that can be affected by the fulfillment of these operations. The precautions to prevent or reduce the damage to the environment to a minimum in agricultural development are as follows:

- The excessive use of curatives, chemical waste/hormones, and barnyard manure should be avoided in order to protect ground water.
- Pesticides and herbicides should not be used. When required, the drugs that least harm the environment should be chosen and the matter of the amount and time of applying the drugs should be determined by a professional. Use of natural predators is recommended when struggling with pests.
- Excessive watering leads to an increase in salt levels in soil, increases the ground water level. It also causes the soil to be washed, therefore causing drugs and manure to mix with the soil and consequently groundwater faster. Modern watering techniques should be incentivized and both technical and material support should be provided to the farmers in order to avoid this (Bollukcu, 2014).
- Erosion preventive agricultural operations and ecological agricultural operations should be incentivized.
- Academic support should be provided to farmers regarding methods of utilizing of natural resources, wildlife, methods for vegetable and animal production, environmental pollution, and especially the use of water sources.
- Farmers should be given training on the subjects of land conservation, methods for processing soil, agricultural production techniques, manure and chemical drug use, and organic agriculture.

Forests are an important natural resource that not only provides economic gain producing raw materials, but also provides a service to the people with all of its other utilities. The forests that have always been used in a ravaging way to this day need to be protected both legally and administratively (Gençay, 2010). For the sake of protecting and assuring the sustainability of the forests resources, these are most important precautions that the forestry sector can take in order to prevent or reduce to a minimum the damage to the environment:

- The pollution of forests and streams should be prevented, erosion control projects should be performed in areas with a risk of erosion.
- Areas that are important in terms of biological diversity should be determined and legally placed under protection.
- Inventories for not only essential items, but also for forest byproducts should be made for forests that are run for economic purposes. Projects to prevent forest smuggling, bio-smuggling, and poaching should be undertaken (Bollukcu, 2014).
- The level of awareness regarding the ecological and economic significance of the forests, forest fires, and the dangers and legal aspects of illegal logging should be raised (Bollukcu, 2014).
- Operations performed in or around forest spaces that are important to biodiversity should be determined by professionals on the matter, grazing and/or recreational activities should not be allowed in these areas.
- The precautions that can be taken to prevent or reduce to a minimum the damage done to the environment during touristic operations are as follows:
- Natural or cultural values that could provide a source of tourism should be actively protected with legal and administrative means in order to ensure their sustainability.
- A natural and cultural resource inventory should be made. Areas that are ecologically sensitive should be specified, important habitats and biotopes should be specified, and a detailed inventory regarding flora and fauna should be created.

- Touristic operations that are carried out on rural land should be prepared based on the sustainability principle. Touristic activity's places, borders, types, and capacities should be decided on according to a natural resource inventory in order to protect the ecosystem, biodiversity, and wildlife (Açıksöz, Bollukcu & Çelik, 2016).

4. CONCLUSIONS

No matter how much the desired result of a rural development is based on economical bases, a development initiative that is not based on ecological fundamentals will not give the desired result in the long run. It will lead to otherwise irreparable deteriorations and degradations. Ensuring the healthy continuation of natural and cultural heritage in rural developments will also lead to continuity in the development act. If we were to look at today's developed countries we'd see that the policies they follow are not solely economical focused, but that they are also sustainable and environmentally focused.

The EU that only had rural development policies intended to structurally support the agricultural sector in the past, now reverberates the problem solving initiatives that are more integrated with rural areas in their policies (Tartıcı, 2013). Rather than consisting of limited subjects such as watering in agriculture or drainage, the rural development aimed planning projects touch upon comprehensive subjects such as water source management or sectoral product management (Clayton, Dent & Dubois, 2000).

Among main focuses of the rural development policies that were adopted after the planning era in Turkey was economic growth. As for the new tropisms that formed around the EU objectives; the protection of environmental and cultural resources has also started to settle into the main objectives. Today, the upper scale planning projects that are being carried out all around Turkey show the start of an understanding of sustainable development along with the participatory planning and management in the entire basin being adopted (Bollukcu & Açıksöz, 2013). The protection and continuation of natural and cultural values is an important way to reach ethical solutions through an ecological viewpoint of rural development. This is why all shareholders of development-protection projects should have the same level of ethical sensitivity (Açıksöz *et al*., 2016).

Industry-specific interventions that only work on initiatives with upper scale objectives, that ignore the relationship between rural and urban, that don't show regard to the ecological structure will not only negatively impact the success of rural development initiatives, but will also damage the natural and cultural structure.

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Chapter 33

Brussels' Urban Cultural Landscapes: New Design Concepts by International Students

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1. INTRODUCTION

Urban transformation has been ongoing and shaping cities throughout human history. The scale of the prevailing urban transformation since the mid-1980s is unprecedented and the nature and direction of urban growth is more dependent on the economic activities than ever before. In many parts of the world, urbanization is being accelerated by the expanding global economy, which is literally changing the face of the planet. Increasingly, urban transformation is being influenced by continued socio-economic and environmental economic dynamics. Managing urban transformation in this context has increased in both scope and complexity, and has become one of the most important challenges of the 21st Century (Yang, 2010).

Brussels is the capital and largest city of Belgium and the *de facto* capital of the European Union (EU). It is also the largest urban area in Belgium, comprising 19 municipalities, including the municipality of the City of Brussels. Like all major European conurbations, Brussels is facing important urban and social challenges, linked to demographics and migratory flows, urban economics and public amenities. After becoming one of the official capitals of the European Union in 1992, the transformation of the Brussels' urban area has accelerated.

Cultural landscapes are distinct geographical areas that represent the combined works of nature and man (UNESCO, 2003; Rössler, 2006). Created through human and nature interaction, cultural landscapes can transfer inherited knowledge and experience from past to future. Unlike built heritage structures, cultural landscapes can exist both as an artifact or a system which could be a product of cultural and social processes. Hereby man-made products as an integral part of many cultural landscapes can be appreciated by the interpretation of forms, designs, material and by the source of inspiration.

Cultural landscape issues have been gaining an increasing interest in recent years in European and international context. In 1992, the World Heritage Convention became the first legal instrument to recognize and protect cultural landscape worldwide (Rössler, 2006); and European Landscape Convention came into force in 2004 to

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promote landscape protection, management and planning, and to organize European co-operation on landscape issues (Atik et al., 2010). The Recommendation (Rec, 2002) by the Committee of Ministers of the Council of Europe on the Guiding Principles for Sustainable Spatial Development of the European Continent, which was adopted by the European Conference of Ministers responsible for regional planning (CEMAT), also deals with the landscape. One of the aims of the Guiding Principle is to protect Europeans' quality of life and well-being by taking into account landscape, cultural and natural values. And more recently, International Federation of Landscape Architects set up a Cultural Landscape Committee (O'Donnell, 2009) to understand and intervene in an appropriate evolution of cultural landscapes to develop such skills to assure their vibrant future.

The historic urban landscape and the urban cultural landscape are interchangeable terms. Since 2005, intensive discussions grappling with the meaning, character and values residing in the historic urban landscape have also resulted in the Vienna Memorandum and in resolutions from international meetings. In the preamble to a progress report in November 2006, Ron Van Oers noted that, during its 27th session in Paris in 2003, the World Heritage Committee called for the organization of a symposium to discuss how to properly regulate the needs for modernization of historic urban environments, while at the same time preserving the values embedded in inherited townscapes (Ron van Oers, Coordinator of the World Heritage Cities Programme, 25 November 2006). Succinctly stated, the mission is to retain heritage values, which can be directly linked to spirit of place in the landscape because it is from the landscape that the original canvas of urban form springs. The resulting human and landscape interaction evolves to communicate aspects of the unique urban landscape spirit. The historic urban landscape is embodied in this evolution of place and humanity (O'Donnell, 2008).

The urban place, shaped over decades and centuries, expresses its altered heritage landscape, the interaction of nature and culture. The urban cultural landscape shapes the character of the city, town or village, a combined work of people, place and time, defining it as unique. For example, riverfront and sea harbor communities across the globe share common origins and some similarities as well as unique characteristics (O'Donnell, 2008) an intention of creating a unique sense of place needs a unique tie between past and present and a strong inspiration in design. According to Sauer (1925), culture is the agent, the natural area is the medium and cultural landscapes are the results. Therefore cultural landscapes of the past are still unique source for design and landscape architecture as a product of culture and space (Atik et al., 2010). Good practice of landscape architecture maintains an integral part of the design process and hereby landscape design helps us how we can best use our environment. Relatively, all cultural and natural assets that surround us can be source of inspiration in landscape design. Representation of cultural values and cultural knowledge in landscape design can offer cultural dimension into modern landscapes that we live in and refresh quality of life in our modern world.

2.PROJECT DESCRIPTION

CultureScape is the acronym of the project entitled "Identity-Diversity-Integrity: Cultural Landscapes in Landscape Design" which is funded by the European Commission through Erasmus Intensive Programmes. An Erasmus Intensive

Programme is a short program of study, which brings together students and staff from universities in different countries in order to encourage efficient and multinational teaching, to enable students and teachers to work together in multinational groups, to gain new perspectives on the topic being studied, to allow teaching staff to exchange views and to test teaching methods in an international classroom environment (European Commission Education and Training, 2012).

CultureScape Programme, coordinated by Akdeniz University, Turkey, started in 2011 and lasted three consecutive years. The project involved teaching staff and students from four partner universities in three countries (Turkey, Belgium and Germany). The target group was both undergraduate and postgraduate students from the partner universities who were studying landscape-related issues in academic programmes.

The objective of the programme was to assess and understand how cultural landscapes have evolved over time and can be related to specific determining factors in local and wider European context and how cultural heritage can be integrated into education, research, professional, administrative and political practice. Participating students were supposed to have learned how to use cultural landscape values of a district/region/country while making planning and design decisions. The activities of the project took place in three different cities as Antalya (Turkey), Brussels (Belgium) and Dresden (Germany) with different landscape characters. The second round of the project took place in Brussels, Belgium, on the urban area of the City of Brussels.

3.MATERIAL AND METHOD

The wider study area is the urban area of Brussels, which was founded on the Senne River. Brussels developed at the site where Senne was no longer navigable and goods had to be unloaded onto ground transport. Until the 16th century, the Senne served Brussels as the only navigable artery. The construction of the Willebroeck Canal in 1531 reduced the river’s commercial role and after the construction of Brussels-Charleroi Canal, Senne was no longer needed for transporting goods.

The Senne River, the catchment for wastewater in the Brussels area for centuries, was essentially an open sewer and the source of epidemics in the area since the 16th century. In the 19th century, it remained a visual and medical blight on the Brussels city centre, a source of flooding, and an embarrassment to the governments. Therefore, vaulting the Senne was one of the defining events in the history of Brussels. From 1867 to 1871, a section of the Senne River was covered by a project designed by the architect Leon Suys and constructed under the direction of the mayor of Brussels. The river then disappeared under Lemonnier and Anspach Boulevards. In 1877, the river was further covered from the Brussels Zuid Station to the Brussels North Station. At that point, a large section of the river in the city centre was completely covered. Between 1930 and 1950 the Senne River was diverted to a new location and completely covered from the Rue des Vétérinaires to Quai des Usines. The old Senne tunnels were then used for the "pre-metro," an underground tram. Today, some parts of the old Senne tunnels are completely unused, except as basins for storm water, and few people even know that there is a river in Brussels. That is why, Brussels is sometimes called “*a city which hides its rivers*”.

3.1.Material

The Maalbeek River is a tributary of Senne River and runs through several municipalities in Brussels, including Etterbeek, Elsene, St-Joost-ten-Noode and Schaarbeek. Its source is located near the Abbey of La Cambre to the north of the city. In this study, Maalbeek Valley was selected as the study area (Figure 1).

The name ***Maalbeek***, meaning “Mill” and “Stream” originates from Dutch words ***beek*** meaning ***stream*** and ***maal*** meaning ***mill***, which refers to the meaning stream with a mill, which also represents that stream on the valley was harvested by a mill for production of the energy in the past. The Maalbeek Valley includes Etterbeek, Elsene, St-Joost-ten-Noode and Schaarbeek quarters of Brussels city which are defined as the historical core of the city, dissected by Senne valley. It is a large plain, gently inclined towards the north and formed by the alluvial deposits of Senne River. The difference in altitude between the top of the hills and the valley is about 80 meters.

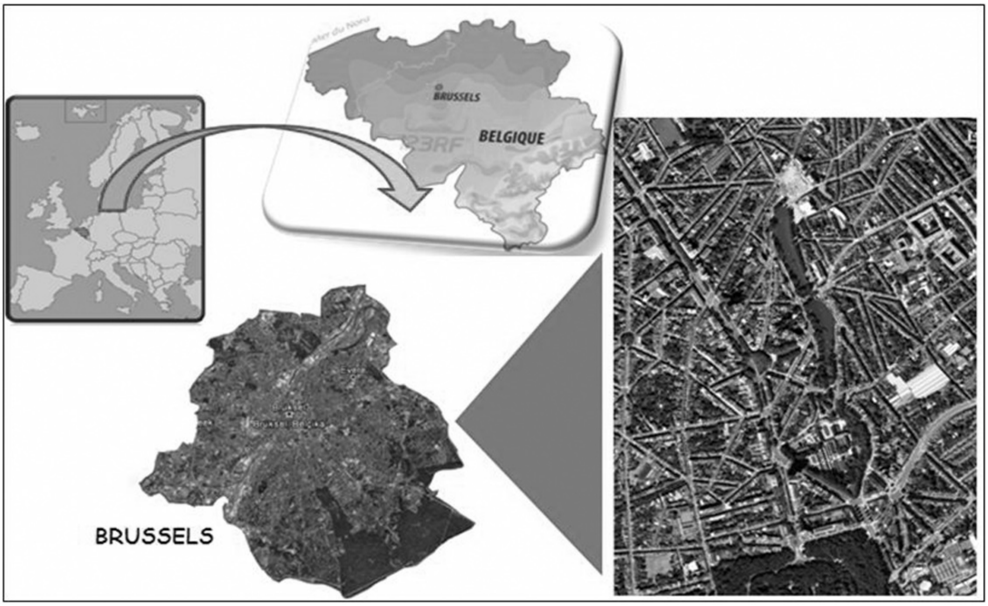

Figure 1. Maalbek Valley in Brussels, the study area.

Maalbek River was vaulted together with Senne River. Vaulting the Maalbeek in 1872 changed the landscape dramatically. Before 1872, there were 58 ponds along the stream and the area was largely rural. The ponds were then used for fishery; the surrounding land was agricultural land. After vaulting the river and draining some of the ponds, the urbanization process on the valley has accelerated. Today, only six ponds are left: the ponds of the Abbey of Ter Kameren; of Elsene (two); of Leopold Park; of Marie-Louise Square; and of Josaphat Park. The remaining water features in the above mentioned parks have low ecological quality. Vaulting the rivers wasn’t the best solution; parts of the valley are still dealing with problems of managing rain water due to high degree of sealed surface and covered streams.

3.2.Method

The project itself consisted of twelve consecutive days of intensive activities in the form of in-class, on-site and in-studio works. Participating students were divided into six groups, and in order to provide a better intercultural teaching and learning experience, each group had at least one student from each partner institution. Maalbek Valley was divided into six sections in order to allow students to work on one section of the valley. The mixed student groups were asked to analyse and describe the past of the valley, existing situation and potentials, and to develop landscape planning proposals and suggest design projects for their respective areas. Their considerations had to be based on the cultural background of the area. Teaching staff and local experts delivered presentations on aspects related to cultural landscapes; conservation and landscape design, and also supervised the groups during the development of student projects. Communicating with inhabitants and local decision-makers was an essential prerequisite to understanding present land use and the state of cultural as well as natural landscape elements.

During the first stage, students did surveys, analyses and syntheses of Maalbeek Valley. In the second stage, they developed planning and design solutions for the valley with the inspiration of time and space dimension of the cultural landscape.

4.PLANNING AND DESIGN IDEAS FOR MAALBEK VALLEY

Six different projects were developed by the participating students for Maalbek Valley. Main design concepts are explained below:

4.1.Group "Pentagon-Zinn City"

Group "Pentagon – Zinn City" defined the five pillars of their project as ecology, connectivity, quality, social collectivity and identity. The group worked on a water-retention plan which included water designed squares, recovered ancient water structure, self supporting information system for private and common use, and designed water features on boulevards. Particular attention was put on the collection of urban surface water with a special design of water collectors which would also be functioning as street lighting posts. A number of design ideas, such as socially and spatially connected features, pedestrian and cycle paths, information and guiding system, sculptures, lighting and furniture and ancient structures, were developed. Extension of the existing pedestrian and cycling paths was the main tool in providing connectivity where squares were translated into public spaces for social connectivity. Quality of urban nature was defined with public and private open and green spaces. Here, street plantation between existing green spaces and creating community gardens were identified as the major tools to improve quality of urban nature (Figure 2).

4.2.Group "Collector / Twister"

The slogan of the group "Collector / Twister" was "*to bring back Maalbek and Rodebek valleys*". Collecting rainwater from the building surfaces and roofs with a pipe system alongside the building facades was the main design concept. The group aimed at building up a water collection system for Maalbek Valley to maintain sustainable use of rain and surface water. Improving public green spaces and squares was another design idea of the group. Water collecting points and pipes, new squares and connecting squares, new green spaces and connecting green areas were the main project components to bring back Maalbek and Rodebek valleys. The group chose four main street lines for greening (Figure 3).

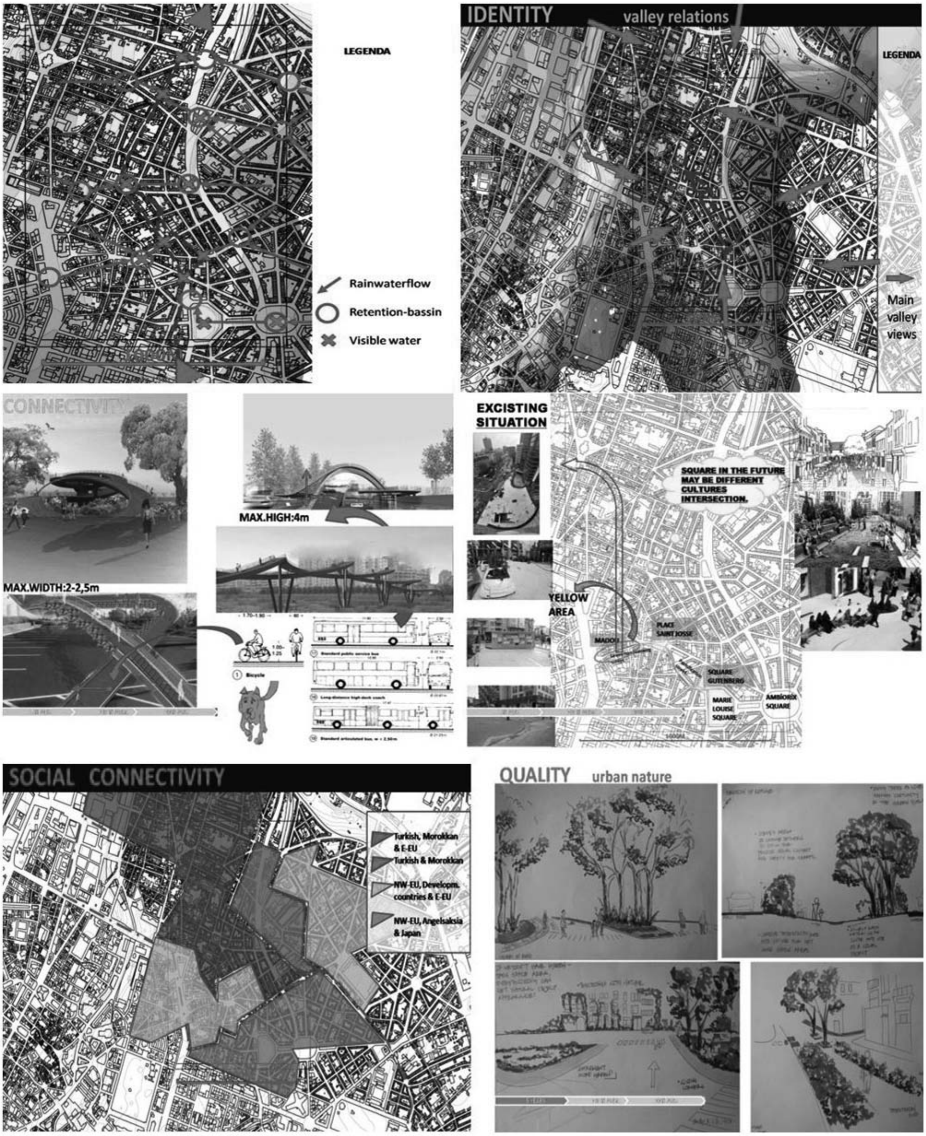

Figure 2. Drawings from the design project of the group "Pentagon-Zinn City"

4.3. Group "Green Impact"

The main concept of the group "Green Impact" was to bring Brussels' former green character into the forefront. Their green infrastructure proposal was based on the idea of connecting all green areas and patches in the city and building up an ecological network within the urban fabric. Important green places were connected by old and new green walkways. One of the aims of green infrastructure was to provide good climate for the city and improve environmental comfort which would reduce energy and create more efficient function for infrastructure. Some design solutions for the former railway route and for the former industrial area were developed. An ecological bridge called "ecoduct" was designed to connect the two sides of Senne River (Figure 4).

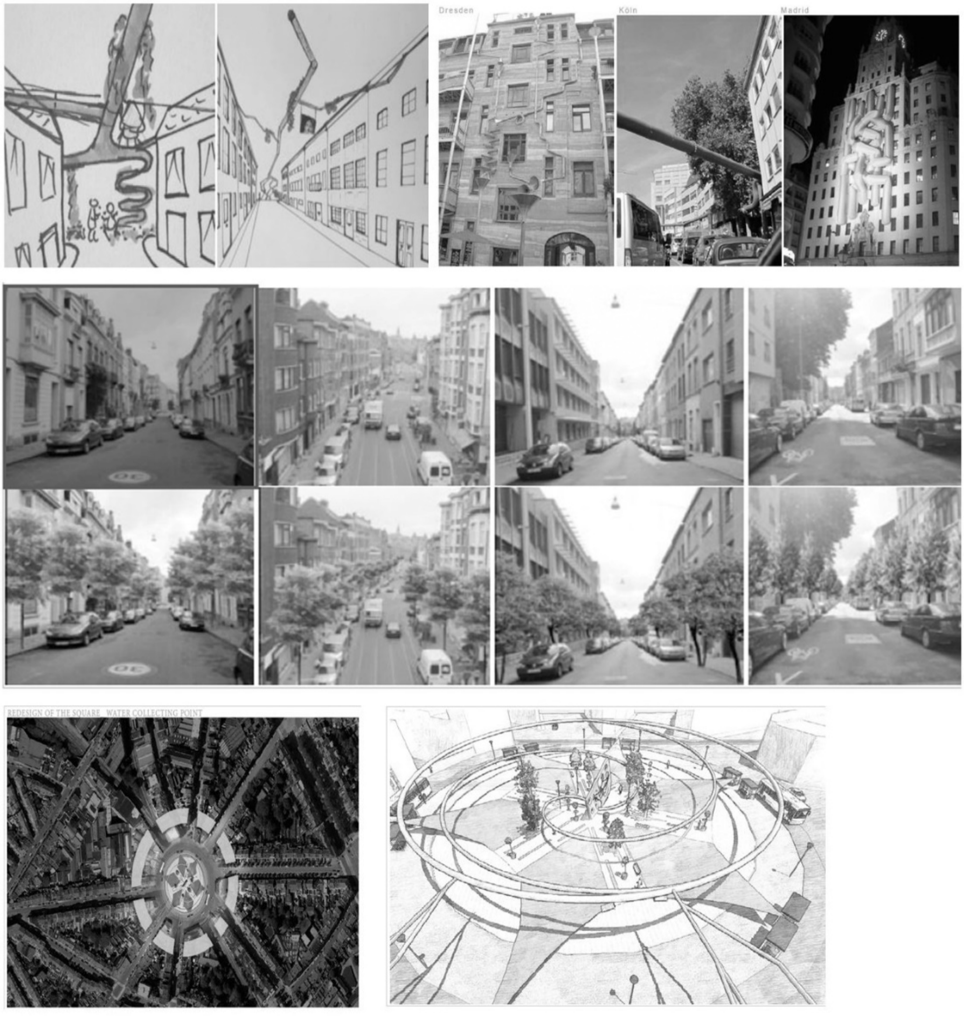

Figure 3. Drawings from the design project of the group “Collector / Twister”

4.4. Group “Mosaic”

The project area of the group “Mosaic” covers three quarters of Brussels as European quarter, Squares quarter and Jordan quarter. Providing connectivity between the existing green spaces was one of the design concepts of the group “Mosaic”, too. In this respect, a green overpass bridge was developed for the railway line which was passing through that part of the city. Redesign of some parks, squares and streets, in which there would be new elements such as skateboard platforms and water features, were proposed. It was also suggested that rainwater can be harvested and used alongside the main streets as a flowing water course to symbolize Maalbek River (Figure 5).

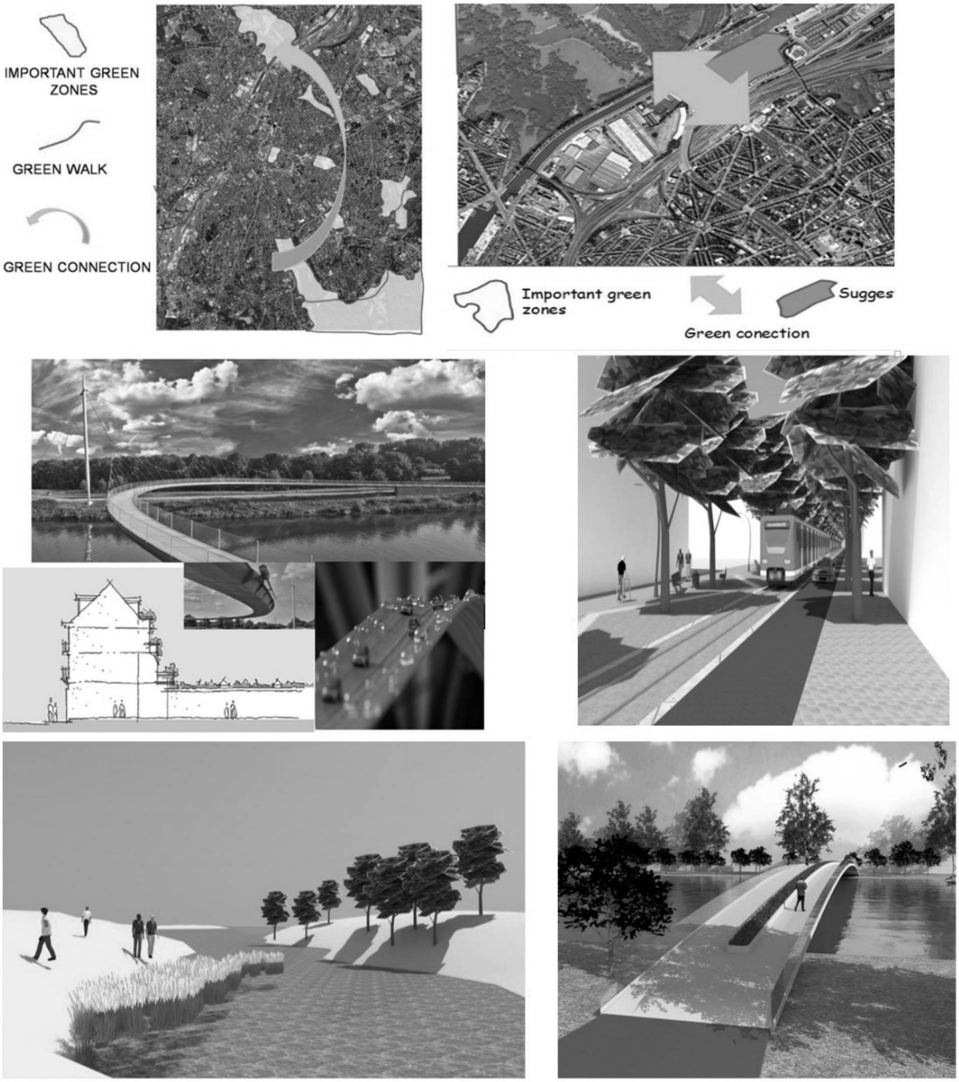

Figure 4. Drawings from the design project of the group "Green Impact"

4.5. Group "Valleyable"

The project area of the group "Valleyable" was the northern end of Maalbek Valley. Design slogan of the group was "*cityable-valleyable-naturable*" which was based on the fact that the area was located between downtown Brussels together with EU quarter and green wedge of Ter Kameren Forest. Therefore, there was an interface between living in the city and getting easily to the nature. Concept idea of the group was based on a sustainable relation among the downtown Brussels, EU Quarter, Ter Kameren Forest and Green Wedge. Since the two important freshwater ponds survived from the dry-out of Maalbek River are located in this area, the design concept of the group was also based on developing water-related recreational facilities and also green-blue connections. Concept idea "secret gardens" was developed for reactivating vacant lots between building blocks by transforming them into green patches. The concept also included vertical gardens on building facades (Figure 6).

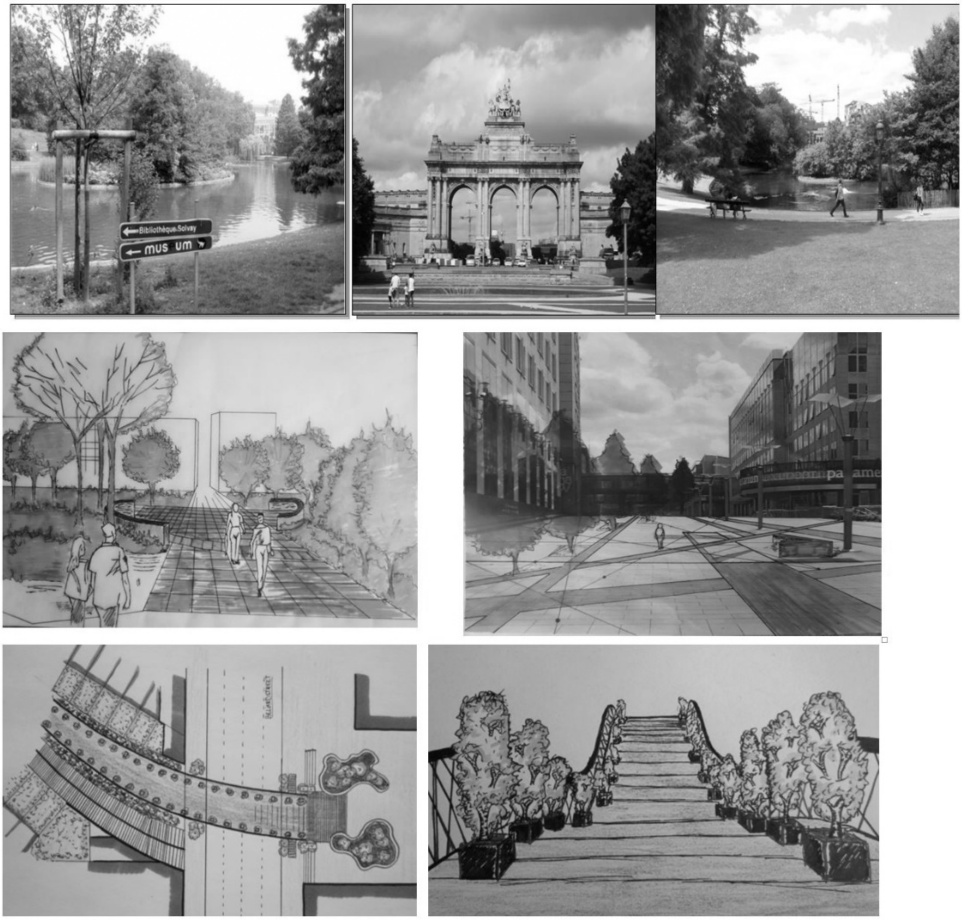

Figure 5. Drawings from the design project of the group "Mosaic"

4.6. Group "Space Invaders"

The project area of the group "Space Invaders" was Etterbeek neighborhood of Brussels. Core concept of the design was to bring back the valley with its original natural character, and also to design the area according to today's needs. Main pillars of the design concept were to connect green spaces through green boulevards; to cover the top of the railway line crossing the neighborhood; to design a new pedestrian zone; to plant green spaces with original vegetation of the valley; to create an artificial pond to symbolize the former ponds in the area. Design idea for Maalbeek Valley was based on the different phases; nature in the past on the valley, today's city on the valley and future's city and nature together on the valley. It was defined as a gradual process in a time scale. It was also intended to create a new artificial stream above the original Maalbek River. Terracing on the valley slopes and small mirror gardens that repeat themselves were thought as the other design interventions.

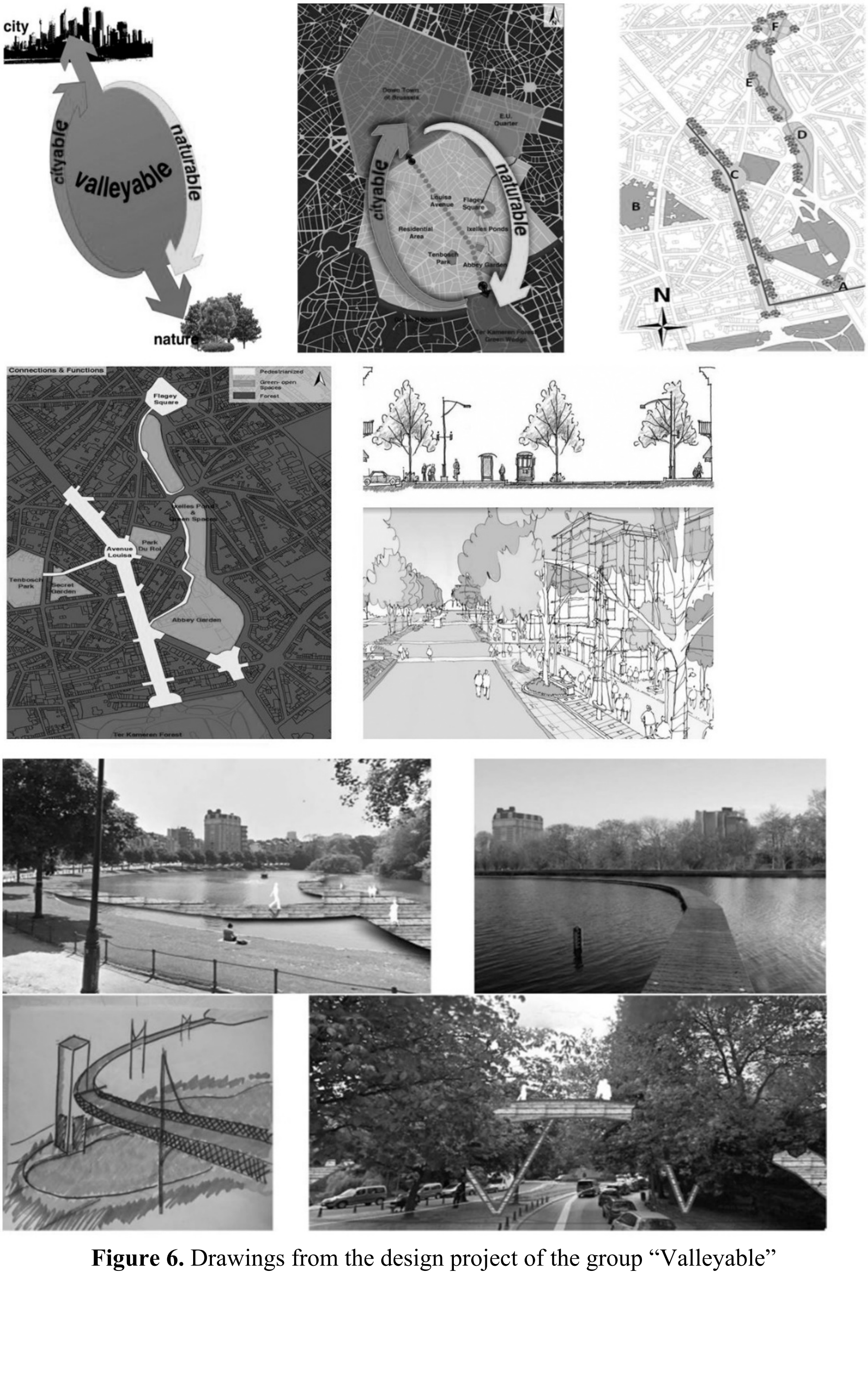

Figure 6. Drawings from the design project of the group "Valleyable"

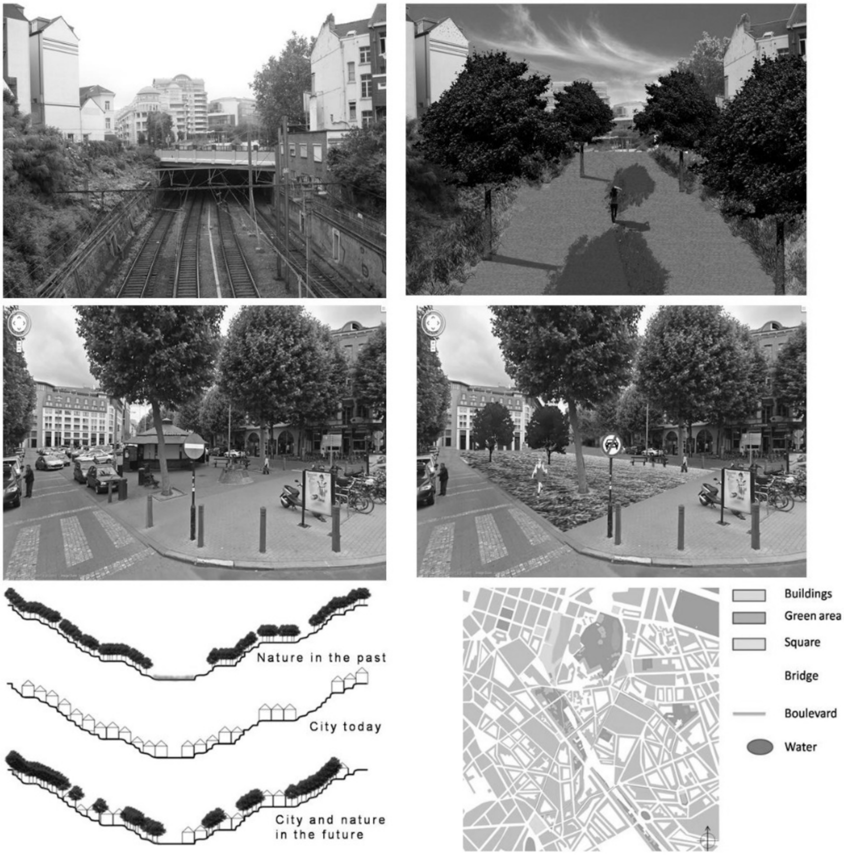

Figure 7. Drawings from the design project of the group “Space Invaders”

5. CONCLUSIONS

Brussels, being a city of valleys in the past due to the topography, turned to be a European metropolis today. As a result of urban and infrastructural developments, former valleys were occupied by buildings and, the rivers forming those valleys were vaulted. As in many metropoles in the world, Brussels had a more artificial urban environment today.

A multinational student group was assigned to develop design concepts to revitalize the cultural heritage of such an urbanized area which is almost totally covered by artificial surfaces. Despite such difficulties as the short duration of the project and unfamiliarity of the most of students with the project area, some interesting design concepts were developed. There were some common points in all six different design concepts developed by the student groups:

- Design solutions to remind the past of the Maalbek Valley to the people living in the project area and in wider Brussels (e.g. artificial streams, water-related designs),
- Design approaches to connect a few existing ponds, –and new ponds to be created- which survived from the dry-out of Maalbek River, with each other and with the surrounding green spaces in order to create a blue-green network,
- Design concepts for a rainwater harvesting system and related water-related

design solutions as a response to water shortage created by the global warming by benefiting from the suitability of the topography,

- Design approaches to revitalize the green tissue of Maalbek Valley in the past as much as possible by means of new street plantations; by using vacant lots as green patches; and by forming roof and vertical gardens.

In addition to some interesting design solutions for Maalbek Valley, the project also provided an intercultural learning opportunity to students and staff from various countries. Despite its short duration, it was observed a positive contribution to the students' intercultural awareness as argued by some authors (Chieffo and Griffiths, 2005). Regarding academic outcomes, it was experienced that intercultural work brought out enrichments and distinctions in the projects, improved social interaction and cooperation, and provided a framework for students and teaching staff to broaden their knowledge on subjects, instrumental academic experience and generic competences in new and inspiring cultural realms (Atik et al., 2012).

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Chapter 34

The Importance of Spatial Ability Research: The Case of Landscape Architecture Education

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INTRODUCTION

Landscape architecture is multidimensional scientific field that require a variety of design abilities. In particular, some field courses such as basic design, graphic drawing techniques, model making, and planting design require creativity and spatial ability. One aim of landscape architecture education is to improve the students' perspective, understanding of thr[†]ee-dimensional drawings and images, and ability to perceive the visual world accurately. Another aim is to enable them to visualize plans in their minds. Concretely seeing figures, colors, textures, shapes and dimensions, which are the basic visual design principles, and transforming them requires spatial ability. Landscape architecture is a complex and interdisciplinary profession. Dealing with spatial problems inside certain societal requirements (Gazvoda, 2002).

In landscape architecture education, stains, main design decisions, drawings and plans are shown as two-dimensional, while sections, views, modelings and detailed expressions are shown as three-dimensional. The main goal of landscape architecture design courses is to enable students to reveal their ability to think in three-dimensions and improve their visual and spatial ability, knowledge and skills.

A landscape architect is a three-dimensional design expert. Landscape architecture is a form of artistic creativity. Design enables the creation of new things. Spatial ability and creativity are very important in design. Landscape architecture education improves the students' architectural design and spatial abilities.

The arrangement created by a formal design is an abstract arrangement. Abstract figures initiate the design process when combined. Abstract arrangement uses the principles and elements of design to generate a concrete end product. Design begins with drawings and graphics on paper. Drawings are the preliminary drafts of design expressed abstractly. Drawings uses graphic expressions and symbols to pass from abstract expressions to visual expression. Three-dimensional expressions are combined with sketches, modeling and spatial ability.

Architectural design is a multifaceted discipline requiring diverse abilities, in particular creativity and spatial ability (Cho, 2012). Spatial thinking concerns the locations of objects, their shapes, their relations, to each others, and the paths they take as they move (Newcombe, 2010).

Spatial ability may be defined as the ability to generate, retain, retrieve, and transform well-structured visual images. It is not a unitary construct. There are, in fact,

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several spatial abilities, each emphasizing different aspects of the process of image generation, storage, retrieval, and transformation. Spatial abilities are pivotal constructs of all models of human abilities (Lohman, 1993). Spatial ability is required in technical and design jobs where drawings and plansa are used, for example; architecture, surviying, engineering and design. It is also important some branches of science and technology where 3 dimensional components are interacting (Newton & Bristoll, 2009).

Spatial thinking is often difficult. People frequently get lost or give directions that are difficult to follow or that contain mistakes. They get frustrated when attempting to put together ''easy to assemble'' furniture, and they yell at each other when trying to pack a small car for a long trip (Newcombe & Frick, 2010).

The act of drawing is an important starting point for the intellectual process we call 'design'. To be able to draw a chair or a building is a prerequisite for anyone wishing to design such things. Drawing has two functions for the designer – it allows him or her to record and to analyse existing examples, and the sketch provides the medium with which to test the appearance of some imagined object (Edwards, 2008).

Drawing means a great deal in landscape architecture from the abstract conceptual stage starting with the design to the concrete stage of construction. Drawings can be made using technical drawing tools (pen, paper, rulers, etc.) or computers and software (2D, 3D, sketch up etc.). Drawing styles may differ, but drawing is an inseparable part of the design process. Although some designers use many drawing methods, abstract forms should comply with the scale when they are finished. Drawing is the art of combining forms and creating new forms. They serve as tools for people to express their ideas. Drawings, either made by hand or in computers, play an important role in the improvement of spatial ability.

Landscape drawing is even more analytical than architectural drawing. Main reason is that there are many scientific facts related to the landscape structure we want to carry over from preliminary drawings to new design. We can include information about the geology by emphasizing geological-tectonic marks, in the landscape drawing. Even more, we work on characteristic topography: edges, corridors, lines, peaks, valleys, sinks, banks and many other features are clearly presented in landscape drawings (Gazvoda, 2002).

The drawings the architect makes to explore and evaluate alternatives are more abstract and less precise than the working drawing handed to the builder specifying what to make. The earliest representations in this process are diagrams (Do and Gross, 2001a). Functional diagrams are used to study various factors that deal with the function and general layout of the design. At this time, less thought is given to specific appearance or aesthetics, which is done later in the design process. Functional diagrams are crucial to the design process because they can (1) establish a sound functional basis for the design solution, (2) encourage the designer to remain general about the appearance of the design, (3) encourage the designer to explore alternatives, and (4) provide opportunities for the designer to go beyond preconceived ideas (Booth & Hiss, 2004).

Thinking, problem solving and connecting displays are very important in planning in landscape design, architectural design, graphic design and engineering. Drawings and graphic expressions are forms of display. Design courses in landscape architecture mean connections, figures and connecting them with each other.

Design is a natural human activity present in many professions (from engineering and architecture, to policy making) and a significant force for innovation and change in our societies. Despite the fact that the activity of design and the activity of science are tightly linked, design can be contrasted to science in that design is considered to be about imagining and synthesising new realities, rather than analysing and describing existing ones. Design can also be contrasted to art, as it is essentially guided by human purposes and is directed towards the fulfilment of intended functions (Alexioua, Zamenopoulos, Johnson & Gilbert, 2009). Designers often speak of design as a process. Typically, design thinking leads to design making, which leads to artifacts. Yet the design process also leads to something more-to new knowledge. Thus, we might characterize designing as a form of learning (Evenson & Dubberly, 2011).

In the contemporary world, where design is all-pervasive, its social, cultural, and environmental effects are daily apparent, either directly around us or through various media (Hodson, 2009). Alexander (Foreword to Davis, Hawley, McMullan, & Spilka, 1997) has pointed out that, "Whether the objective is a product, a building, a city plan, or a graphic communication, when children are engaged in the process of designing, they are learning to identify needs, frame problems, work collaboratively, explore and appreciate the context within which a solution must work, weigh alternatives, and communicate their ideas verbally, graphically, and in three dimensions".

Sketching and diagramming constitute an important procedure in the early conceptual design phases in architectural design. Architects are trained to use pencil and paper to develop design concepts and to communicate their thinking through the act of drawing. Design thinking concerns both form and function. It is a form of visual and spatial reasoning (Do, 2002a).

Diagrams are a means of simplifying or conceptualising and are distinguished by their abstraction, but they have to remain visually accessible in order to be useful. Landscape architects use diagrams to make sense of this complexity, both as analytical tools and as generative expressions of design imaginings (Bowring & Swaffield, 2010). Diagrams play an important role in design practice. Designers draw diagrams to explore ideas and solutions in the early, conceptual phases of design (Do, 1997). Functional diagrams are freehand drawings that use bubbles and diagrammatic symbols to graphically depict the program elements of a design as they relate to each other and to the specific conditions of the site (Booth & Hiss, 2004).

A sketch, in contrast, is about spatial form. It is executed with a finer resolution that indicates attributes of shape. A sketch often comprises repetitive overtraced lines made to explore precise shape, rather than the intentionally abstract shapes of a diagram, and it uses graphic modifiers such as tone and hatching to convey additional information (Do & Gross, 2001b). Architects sketch to help themselves to see and understand the form they work with, and to communicate with others (Do, 2002b).

This study primarily examines the role of design in spatial ability in the light of the current literature. It also addresses the spatial ability of landscape architecture students and the relationship of this ability to design creativity and studio performance. In addition, it describes landscape architecture students' awareness of their spatial ability in courses with design content. It discusses the contexts in which landscape architects develop their spatial ability. This study determined the connection between spatial ability and landscape architecture using findings from a review of the literature. The effect of design on spatial ability is analyzed as discussed by a variety of sources. The books on the design skills in landscape architecture were analyzed first, and then the effect of drawings of landscape architects on design were examined. Finally, the relationship of drawing and design with spatial ability was examined.

MATERIALS AND METHODS

The relevant web pages were viewed and information in the literature was obtained and used as a basis for this study.

First, the content of landscape architecture education and its relationship with spatial ability were explained. Second, spatial ability and some of the courses in landscape education courses were analyzed, and their aims were evaluated. Finally, the results were imagination combined with artistic creativity and the three-dimensional expression of spatial ability.

Landscape Architecture Education

The main aim of the higher landscape architecture education is to train people who can solve the problems that arise form the potential contrasts among different needs while shaping the needs of individuals and society (Gül, Örücü & Eraslan, 2011).

Landscape architecture is in a relationship with civil engineering, architecture, and urban design. In order to create an aesthetic and practical relationship with land, each of their elements is combined with each other to establish the desired result. Landscape architecture is an interdisciplinary profession which becomes significant and meaningful through having a relationship with other sciences and professions (Asl, Faizi & Behzadfar, 2010).

Landscape architecture is a professional field that is significantly focused on landscape pattern-the spatial configuration of landscapes at many scales. Landscape architecture is informed by scientific knowledge and aspires to provide aesthetic expressions in landscapes across a range of spatial scales (Ahern, 2005). It involves landscape planning, design and management to create, enhance, maintain, and protect places so as to be functional, aesthetically pleasing, meaningful and sustainable and appropriate to diverse human needs and goals. Planning, design and management of landscapes are core competences of landscape architecture; they are processes of intervention. These processes require creativity; creativity to find good solutions for landscape development, and also creativity to manage the processes well (including the involvement of relevant stakeholders). Planning, design and management competences are acquired in studio and project learning (ECLAS, 2010).

Landscape architect is; 1. A professional licensed to perform services in landscape architecture. 2. A professional performing landscape architecture by designing changes in land and features thereon for human enjoyment and by planning effective placement of structures, vehicular and pedestrian ways, plantings, earthwork, drainage facilities, buildings, land uses, etc., and producing construction documents for the building of such (Christensen, 2005).

Traditionally, landscape architects develop planning and design solutions for open space, for new housing or commercial developments, for parks, public areas, and, naturally, for gardens. Landscape architects also propose strategies for the development of open space systems and (urban and non-urban) nature development. Equally important, landscape architects are involved in preparing plans for the management of historic gardens and cultural landscapes, of recreation areas in the urban fringe, and of national parks and protected landscapes (ECLAS, 2010).

Spatial ability is very important in landscape architecture education. It is the ability to visualize the shapes that two-dimensional figurative drawings will take when they are turned or slided, to see a figure as three dimensional and to visualize spaces and planting designs by looking at drawings.

Landscape architects draw diagrams and develop sketches in the first stages of project design. They draw bubbles that represent the different areas of use appropriate for their intended use within the borders of the designed area. These bubbles make it possible to visualize different areas of use and identify each area of use. The sketches are generated by visualizing details while drawing the plans. These drawings help architecture students to acquire spatial ability. Sketching and drawing are one of the most frequently used activities for improving spatial abilities (Contero, Company, Saorı´n & Naya, 2006).

Submitting the project for the design and the designers to be criticized is very important in landscape architecture education. Therefore, 3D models have a significant place in the lectures and content of landscape architecture courses. Submitting the design facilitates its expression and creation.

The design and planning of landscapes has a long history and contemporary practice is concerned with issues facing society such as climate change, quality of life at the community level, and sustainable resource use. As landscape architects, we are concerned with the future development, management and protection of our landscapes and believe that sustainable development and human well-being are fundamental to our work. This makes it essential for education and research conducted in academic institutions to provide the knowledge and skills required to allow graduates to formulate appropriate solutions for the present and the future (IFLA, 2012).

Three academic degrees, bachelor's, master's and doctorates, can be earned in landscape architecture in Turkey. Individuals who earn the title of landscape architect have the right to continue in postgraduate programs when they begin to work.

Landscape architecture education addresses ecological, cultural, esthetic and ethical issues while imagining projects. Knowledge and practice is connected in landscape architecture education. Some of the courses in landscape architecture are studio-centered. They are design intensive and offer students opportunities to gain practical experience in drawing, diagrams design and sketching. The students build their design skills such as drawing, pictures and sculptures on a solid basis. Design-intensive courses in landscape education such as landscape design, architectural design, planting design, planning and design, drawing and graphic design, modeling require high-level spatial ability. Using spatial ability is important in these courses since it enables the students to create models of architectural objects on figures. These abilities can be measured by spatial ability tests in landscape architecture as they are in architecture.

Drawings are usually very personal at the beginning of the design process, yet become more and more readable in terms of using standard graphic elements for architectural drawing at the end (Gazvoda, 2002). Spatial thinking deals with three-dimensional shapes, contents or information. Various activities in everyday life as well as in many scientific domains require understanding 3D information based on 2D representations (Berney, Haddad, Hauck & Gradl, 2015).

Spatial Ability

Howard Gardner categorized intelligence in nine groups in his 1983 book, *Frames of Mind: The Theory of Multiple Intelligences*. The nine identified intelligences include verbal-linguistic intelligence, logical-mathematical intelligence, spatial-visual intelligence, musical intelligence, bodily-kinesthetic intelligence, naturalist intelligence, interpersonal intelligence, intrapersonal intelligence, and existential intelligence (Thirteen ed online, 2004).

Spatial intelligence, which also has been referred to as spatial ability, involves the manipulation of information presented in a visual, diagrammatic or symbolic form in contrast to verbal, language-based modality (Lohman, Pellegrino, Alderton & Regian, 1987; Diezmann & Watters, 2000). Spatial intelligence is the ability to think in three dimensions. Core capacities include mental imagery, spatial reasoning, image manipulation, graphic and artistic skills, and an active imagination. Sailors, pilots, sculptors, painters, and architects all exhibit spatial intelligence. Young adults with this kind of intelligence may be fascinated with mazes or jigsaw puzzles (Stachel, 2016). Art creativity affects imagination, ability of forming in different two-dimensional and three-dimensional materials, creating different practical works (drawing, pictures, reprints, sculptures, reliefs, installations) (Nadrljanski, Buzaši & Zokić, 2009).

There are many definitions of spatial ability. Spatial ability may be defined as the ability to generate, retain, retrieve, and transform well-structured visual images. It is not a unitary construct. There are, in fact, several spatial abilities, each emphasizing different aspects of the process of image generation, storage, retrieval, and transformation (Lohman, 1993). Many studies have shown a positive correlation between high spatial ability and an inherent ability in most fields of engineering, chemistry, medical surgery, architecture, and others (Smith, 2009). Spatial ability is the capacity to understand, reason and remember the spatial relations among objects in space. There are four common types of spatial abilities; spatial or visuo-spatial perception, spatial visualization, mental rotation, spatial working memory (Stachel, 2016).

Spatial ability in the domain of architectural design is essential for both learning and problem-solving, even when a problem is not specifically spatial (Alias, Black & Gray, 2002; Sutton & Williams, 2011). From this it can be easily deduced that spatial ability plays an important role in architectural education and for the learning experiences of architecture students (Sutton & Williams, 2011). Whether studying 2-dimensional representations or working to better understand 3-dimensional space, architecture and landscape architecture students spend a tremendous percentage of their time in college improving their spatial cognitive skills (Tulloch, 2012).

Researchers indicate that without spatial ability, success within specific knowledge domains is limited. These domains, while not an exhaustive list, include architecture, astronomy, biochemistry, biology, cartography, chemistry, engineering, geology, mathematics, music, and physics (Hartman & Bertoline, 2005).

Landscape architecture must be creative when we run landscape design analyses and search for the best design solution and also be able to present our projects in proper graphic mode (Gazvoda, 2002).

Spatial Ability and Landscape Architectural Design Learning

The main methods of expression in landscape architecture are drawing and graphical expression as in architecture. Landscape architects produce proposals and drawings to offer futuristic ideas for public places.

Visual and spatial ability is described as pictorial and imagery ability or the capability to perceive the visual world accurately and re-create visual experiences. It includes the ability to visualize forms, colors, shapes and textures in mind and transform them into concrete pictures (Başaran, 2004).

Spatial-visual skills incorporate a person's ability to visualize and mentally transform or manipulate an object in space (Tseng & Yang, 2011). For example, landscape architects use their spatial ability in the cycle of a plan-based project (single or mass housing, etc.) from the sketches, diagrams and drawing techniques used while drawing to the three-dimensional detailed expression of the project.

One source estimates that 80% of jobs primarily depend on spatial ability, not on verbal ability. Surgeons, pilots, architects, engineers, mechanics, builders, farmers, trades people, and computer programmers all rely on spatial intelligence (Bannatyne, 2003; Basham, 2007).

Design in landscape architecture consists of analysis, drawing, problem solving, and finding appropriate options. Design is the process of taking ideas and producing a work of art, a work to complete, a visual or written instruction for completing a work, etc. (Chiristensen, 2005). Drawing and design concerned with the design of objects or artifacts, there has been a long tradition of using drawings and other pictorial forms as part of the design process. This can involve the use of quite abstract diagrams, such as functional diagrams or sketch plans and sections, in the early part of the design process, together with unstructured forms of pictorial representation such as sketching (Purcell & Gero, 1998). Landscape design aims to transform 2D drawings into 3D objects in terms of dimensions, shapes, materials, colors and esthetics.

DISCUSSION AND CONCLUSIONS

This study was compiled to determine whether or not the courses in landscape architecture are related to spatial ability and was expected to find a positive result. This review involves the contribution of the design courses and programs to spatial ability.

It can be concluded that departments of landscape architecture have the mission of training landscape architects who plan, design, improve, manage and maintain the continuity of functional, aesthetic and sustainable landscapes that meet the needs of society and the environment. It can also be concluded that in departments of landscape architecture where planning and design are prominent, the knowledge, skills, abilities and qualifications that students should have at the end of their education are primary considerations in the determination of education and training approaches. Another issue taken into consideration in the curriculum of landscape architecture is the fields and kind of problems for which the graduate students, considered to have the determined qualifications, will find solutions in their professional lives.

This study focused on the importance of spatial ability in landscape architecture education. The higher spatial ability of individuals who are successful in the fields such as science, technology, engineering and mathematics indicates a relationship between these fields and spatial ability. Spatial ability affects many skills, particularly academic success, in landscape architecture education. Therefore, improving the spatial abilities of landscape architecture students may produce positive results.

People often use spatial ability to meet their needs in daily life. They use spatial ability in all aspects of life, while watching television, reading a book, drawing, driving, or walking. Spatial ability, which is actively used in many aspects of life, is defined as a combination of the skills of recognizing objects from different perspectives, visualizing the two-dimensional structures in three dimensions, or moving the parts of an object individually or as a whole (Yıldız and Tütün, 2011).

Spatial ability is the ability to comprehend the spatial relationships between objects. Visual and spatial ability is important to solve many issues that may be encountered in daily life, unlike other types of ability. Landscape architecture aims to unite other disciplines and nature to reveal its creative aspects and ability to solve problems. This study sought a common ground between landscape architecture and visual and spatial ability.

The survey, analysis, resource values (cultural, social and economic), and landscape values of the area to be designed are determined first while evaluating the outcomes of landscape architecture work. Accordingly, land use rules are generated during the design phase. Proposals are created in an organized way using the principles and elements of basic design and rendered as 2D and 3D drawings. Visual and spatial ability comprises all of these stages.

Landscape architects use drawing as a tool to put their ideas on a paper. They use diagrams and sketches in the projects they create using their own methods. Purcell and Gero's (1998) discussion has demonstrated that analyses of design protocols revealed a number of regularities in the way drawings are used as part of the design process. Design education is an inseparable part of landscape architecture education. Further, visual ability is an important factor in the design process. Sketches and diagrams are one way to create complex ideas using spatial ability. Therefore, spatial ability practices play a critical role in landscape architecture. Although many drawing programs and software exist today, conceptual and creative design work is still done using pen and paper. Spatial ability also steps in this issue as it uses brainpower. Transforming 2D drawings into 3D using the imagination is also a result of spatial ability. Spatial intelligence, one of the seven acknowledged human capabilities, is the result of millions of years of evolution. Spatial intelligence is the most under-appreciated of the human intelligences because it is non-verbal, difficult to quantify, and - using all of our senses - is more than visual (Schaik, 2000).

First of all, this compilation can serve as a study of this issue and be replicated with more effective proofs. A procedure can be provided to determine the relationships of the content of landscape architecture courses with spatial ability and to process this information properly.

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Chapter 35

Contribution of Green Infrastructure System on Water Management

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INTRODUCTION

All living things need water. It is the world's most precious resource and everything depends upon the water. Despite the massive role water plays for people and nature, it is a surprisingly finite resource. But the fast-paced world has forgotten this important reality. In addition to this negligence, many factors including the population, urbanization, industry and pollution are increasing rapidly.

Water is essential for all life on earth and plays a central role in human development: from sanitation and health, to food and energy production, to industrial activities and economic development (GP, 2015-URL 1). Water is an essential component of national and local economies, and is needed to create and maintain jobs across all sectors of the economy. Half of the global workforce is employed in eight water and natural resource-dependent industries: agriculture, forestry, fisheries, energy, resource-intensive manufacturing, recycling, building and transport (UN, 2016-URL 2).

The pattern of water use is influenced greatly by the concentration of the population, urban agglomerations and economic activities in dry and sub-humid areas. This results in intense competition for scarce water resources in concentrated areas or specific seasons, unsustainable practices of water use, growing water pollution, not only by sewage but also increasingly by agriculture and mining, and the destruction of watersheds (UN, 2016-URL 2).

In recent years, the world has become more than one-half urban for the first time in history (54.5 percent in 2016). Approximately one quarter (23.9 percent) of the world population lives in urban areas of 1000000 populations or more. Less than 30 percent (28.6 percent) lives in urban areas with 500000 or more population. Further, more than 70 percent of the world's population lives in urban areas with less than 500000 residents or in rural areas (URL 3).

In many countries, population and economic growth as well as urbanization have increased water demand while supply has remained unchanged or even decreased due to climate change. Although 2.6 billion people have gained access to an improved water source since 1990, dwindling supplies of safe drinking water remain a global problem. More than $250 billion in GDP is lost every year in low- and middle-income countries because of inadequate water supply and sanitation services. Only 68 percent of the world's population has access to improved sanitation facilities. Around 842000 people a

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year die from diarrhea as a result of unsafe drinking water, sanitation, or hygiene (WB, 2016-URL 4).

The amount of precipitation falling on land is almost 110000 km^3 per year. About 56 percent of this amount is evapotranspired by forests and natural lands capes and 5 percent by rainfed agriculture. The remaining 39 percent or 43000 km^3 per year is converted to surface runoff (feeding rivers and lakes) and groundwater (feeding aquifers).These are called renewable freshwater resources. Part of this water is being removed from these rivers or aquifers by installing infrastructure. This removal of water is called water withdrawal. Most of the withdrawn water is returned to the environment some period of time later, after it has been used. The quality of the returned water may be less than the quality when it was originally removed (FAO, 2016-URL 5).

At global level, the withdrawal ratios are 69 percent agricultural (including irrigation, livestock and aquaculture), 12 percent municipal (including domestic) and 19 percent industrial. These numbers, however, are biased strongly by the few countries which have very high water withdrawals. Averaging the ratios of each individual country, FAO (Food and Agriculture Organization of the United Nation) find that "for any given country" these ratios are 59, 23 and 18 percent respectively. World population increased 4.4 times over the last century while water withdrawal increased 7.3 times over the same period. Thus, global water withdrawal increased 1.7 times faster than world population (FAO, 2016-URL 5). Freshwater withdrawals have increased globally by about 1% per year since the 1980s (UN, 2016-URL 2. Clean freshwater is an essential ingredient for a healthy human life, but 1.1 billion people lack access to water and 2.4 billion don’t have adequate sanitation(WWF, 2016-URL 6).

Over the past century, the development of water resources has been largely driven by the demands of expanding populations for food, fiber and energy. Strong income growth and rising living standards of a growing middle class have led to sharp increases in water use, which can be unsustainable, especially where supplies are vulnerable or scarce and where its use, distribution, price, consumption and management are poorly managed or regulated. Changing consumption patterns, such as increasing meat consumption, building larger homes, and using more motor vehicles, appliances and other energy-consuming devices, typically involves increased water consumption for both production and use (UN, 2015-URL 7). In addition water becomes polluted from toxic substances dumped or washed into streams and waterways and the discharge of sewage and industrial waste. These pollutants come in many forms-organic, inorganic, and even radioactive-and can make life difficult, if not impossible, for humans, animals and other organisms alike (WWF, 2016-URL 6).

Water scarcity is likely to limit opportunities for economic growth and the creation of decent jobs in the upcoming years and decades. Unless there is sufficient infrastructure to manage and store the water, as is the case in many developed countries, water availability might vary significantly, leaving (parts of) countries "water scarce" for extended periods. Water availability is also highly dependent on water quality. Poor quality water may not be fit for several uses and the cost of the required treatment may be a prohibiting factor, thus contributing to the burden of economic water scarcity. Reduced water availability will further intensify competition for water among users, including agriculture, maintenance of ecosystems, human settlements, and industry and energy production. This will affect regional water, energy and food security, and potentially geopolitical security, prompting migration at various scales. The potential impacts on economic activity and the job market are real and possibly severe. Many developing economies are located in hotspots of water-related stress, particularly in Africa, Asia, Latin America and the Middle East. Climate change exacerbates the threats to water availability and is expected to increase the frequency, intensity and severity of extreme weather events. Climate change will inevitably lead to the loss of jobs in certain sectors. A proactive approach to adaptation via employment policies may offset some of these losses. At the same time, climate change is creating job opportunities of its own in terms of mitigation and adaptation activities (UN, 2016-URL 2).

The importance of water management has further increased in recent years due to the above mentioned the problems. The goal of this study is to evaluate the main contributions (benefits) of green infrastructure systems on water management. By this way, it will be contributed to water management. Initially, a wide range of water resources management approaches is provided.

WATER MANAGEMENT

Water issues concern all segments of the society and all of the economic sectors. Population growth, rapid urbanization and industrialization, the expansion of agriculture and tourism, and climate change all put water under increasing stress. Given this growing pressure it is critical that this vital resource must be properly managed. The pressure on water resources highlights the hydrological, social, economic and ecological inter-dependencies in river, lake and aquifer basins. These interdependencies demand more integrated approaches to developing and managing water and land resources (Anonymous, 2009). In a sustainable world that is achievable in the near future, water and related resources are managed in support of human well-being and ecosystem integrity in a robust economy. There appears to be general agreement that sustainability requires a balance between economic development, social development and environmental protection but the optimum balance will vary depending on your perspective (UN, 2015-URL 7).

Today, the importance of water resources has led to the development of various approaches. The aim of these approaches is to develop sustainable and/or holistic and/or ecology-based and/or economy-based, etc. water management However, each approach focuses on more than one point.

Sustainable water management, water infrastructure and access to a safe, reliable and affordable supply of water and adequate sanitation services improve living standards, expand local economies and lead to the creation of more decent jobs and greater social inclusion (UN, 2016-URL 2). Sustainability in this approach refers to community development that meets the needs of the present without compromising the ability of future generations to meet their own needs. The degree to which community needs are met sustainably is evaluated using a "triple bottom line" of environmental, societal, and economic (EPRI, 2010). The concept of sustainable development was first identified in the Brundtland Report in 1987 (UN, 2012). It should be set out here water resources management has been integrated into the concept of sustainability with the discourse of sustainable development. Therefore, sustainable water resources management approach is a product of development.

The integrated water resources management (IWRM) approach co-ordinates water resources management across sectors and interest groups at different scales. It emphasizes involvement in national policy and law making processes, establishing good governance and creating effective institutional and regulatory arrangements as routes to more equitable and sustainable decisions. A range of tools, such as social and environmental assessments, economic instruments, and information and monitoring systems, support this process (Anonymous 2009). A key benefit of IWRM is to foster a shared vision of current challenges and a common desired future, i.e., an improved standard or quality of life of people, alleviation of poverty, conservation of the environment, and equitably distributed resources in a socially acceptable and economically efficient manner. A primary goal of IWRM is to manage water in a sustainable fashion achieving balance among the competing uses and requirements for water. To achieve this basic goal, IWRM is as much about process as it is about substance. That is, IWRM recognizes that an inclusive process that provides the opportunity for the engagement of the public, stakeholders, and all levels of government is essential for finding the balance necessary for sustainable water management outcomes (USACE, 2014-URL 8). IWRM Approach was first heard at the 1977 United Nations Conference. But the approach has a long history and to be a pioneer of this approach in many countries for centuries has been used models (Can, 2015). It should be noted here this approach is particularly focused on the integration of legal, institutional structure, and functioning.

A central philosophy of an integrated approach to water resources management is that water should be managed at the lowest appropriate level. This means taking a watershed approach where appropriate and decentralizing decision making, usually with increasing input and role for various stakeholders with an interest in how water resources are allocated and management decisions are being made (UN, 2012).

Today, water resources management reveals a key shift in philosophy away from single-purpose water resources development with limited sponsors for localized benefits to broad-based management at watershed scale (USACE, 2014-URL 8). The watershed has been recognized as a practical hydrological unit for water resources management (Anonymous, 2009). Watershed management is simply a systems approach to environmental protection. A watershed is an area of land that drains into a lake or river. As rainwater and melting snow run downhill, they carry sediment and other materials into our streams, lakes, wetlands, and groundwater. A watershed is the area of land that catches all precipitation (such as rain and snow) and drains or seeps into a marsh, stream, river, lake or groundwater. You are in a watershed now. Understanding your watershed is the first step in protecting the water and other natural resources. Healthy watersheds are vital for a healthy environment (Anonymous, 2006). Watershed management approaches are evolving throughout the country and are being used to solve tough problems. On the following pages are 6 examples of successful watershed management cases. Based on successful watershed management efforts like these across the country, this tutorial presents four core principles of watershed management: "watersheds are natural systems that we can work with; watershed management is continuous and needs a multi-disciplinary approach; a watershed management framework supports partnering, using sound science, taking well-planned actions and achieving results; a flexible approach is always needed" (EPA, 2016-URL 9). The concept of water resources management within watersheds originated as early as the 1890 with the work of the U.S. Inland Waterways Commission. The Commission reported to Congress in 1908 that each river system-from its headwaters in the mountains to its mouth at the coast-is an integrated system and must be treated as such (Inland Waterways Commission, 1908). The focus of water resources management then and throughout the first half of the century was on efficient use of water resources for such purposes as energy production, navigation, flood control, irrigation, and drinking water. The 1950s and 1960s saw increased emphasis on improving ambient water quality and protecting the nation's drinking water, much of which comes from groundwater. The watershed-based the National Pollutant Discharge Elimination System (NPDES) permitting approach takes into account the entire watershed in 1972 and then (Anonymous, 2006). Over the past 15 years there has been a growing foundation for watershed management. More and more agencies, institutions, local governments, and associations are using the boundaries of watersheds to organize and implement water resources programs (EPRI, 2010). There is a dynamic relationship between watershed stakeholders and central governments, who have to work together to ensure the viability of their decisions in meeting sustainable development goals (Anonymous, 2009). It must be emphasized again at this point watershed management aims to manage water in the natural boundary beyond the institution boundary. In this case the water resources management in one of the most sensitive indicators of ecology-based approach.

These three main approaches, it relates to the planning and management of water at upper scale (territorial, etc.). Moreover, this approach is directing the planning and management of water at subscale (local, etc.). In this context, water management models have been developed for rural and urban areas. Green infrastructure is the subject of this study is one of the model created in urban areas. As Bahri (2012) also stated the goals of urban water management are to ensure access to water and sanitation infrastructure and services; manage rainwater, wastewater, storm water drainage, and runoff pollution; control waterborne diseases and epidemics; and reduce the risk of water-related hazards, including floods, droughts, and landslides. All the while, water management practices must prevent resource degradation. The effective ways to prevent and reduce pollution of water is managed on the basis of natural boundary (watershed), the natural cycle, and natural purification. Green infrastructure (GI) systems has been developed in the framework of this philosophy at the subscale.

GI SYSTEM: ROOT, DEFINITION AND BENEFITS

GI is a new term, but it's not a new idea. It has roots in planning and conservation efforts that started a hundred and fifty years ago. The roots can be traced to theories and practices that emerged in Western planning, including Olmsted's greenway visions (Benedict&McMahon, 2002; Walmsley, 2006). In his work in public parks in the late eighteenth and early nineteenth centuries, landscape architect Frederick Law Olmsted believed that "no single park, no matter how large and how well designed, would provide the citizens with the beneficial influences of nature." Instead parks need "to be linked to one another and to surrounding residential neighborhoods." This idea of linking parks for the benefit of people (e.g. with a focus on recreation, pedestrian and bicycle trails and public health) has evolved into the modern greenways movement. Second, wildlife biologists and ecologists have long recognized that the best way to preserve native plants, animals and ecological processes is to create an interconnected conservation system to counter habitat fragmentation. Protecting and restoring connections between parks, preserves and other important ecological areas is a key concept for the science of conservation biology and the practice of ecosystem management (Benedict& McMahon, 2002).

GI system has its origin in two important concepts: (a) linking parks and other green spaces for the benefit of people, and (b) preserving and linking natural areas to benefit biodiversity and counter habitat fragmentation (Benedict&McMahon, 2002). GI includes the network of green spaces and other natural elements such as rivers and lakes that are interspersed between and connect villages, towns and cities (LI, 2009). It can be considered to comprise of all natural, semi-natural and artificial networks of multifunctional ecological systems within, around and between urban areas, at all spatial scales (Tzoulas *et al.,* 2007).

The most specific definition of GI used by Benedict & McMahon (2002), is that it "is an interconnected network of waterways, wetlands, woodlands, wildlife habitats and other natural areas; greenways, parks and other conservation lands; working farms, ranches and forests; and wilderness and other open spaces that support native species, maintain natural ecological processes, sustain air and water resources and contribute to the health and quality of life for (American) communities and people" (Benedict & McMahon, 2002). GI can be broadly defined as a strategically planned network of high quality natural and semi-natural areas with other environmental features, which is designed and managed to deliver a wide range of ecosystem services and protect biodiversity in both rural and urban settings (EU, 2013).

The GI system is not intended to be separate and isolated from land uses such as residential or commercial development and agriculture, but rather to be integrated into the fabric of the urban in multiple forms and at multiple scales (LCPC, 2009). It is the network of natural and semi-natural areas, features and green spaces in rural and urban, terrestrial, freshwater, coastal and marine areas. It is a broad concept, and includes natural features, such as parks, forest reserves, hedgerows, restored and intact wetlands and marine areas, as well as man-made features (Figure 1). (Naumann *et al.,*2011).

GI system encompasses a wide variety of natural and restored native ecosystems and landscape features that make up a system of "**hubs, greenways, nodes, and links**" (Figure 2) (Benedict&McMahon, 2002; LCPC, 2009). The basic aims of GI are to promote ecosystem health and resilience, contribute to biodiversity conservation and enhance ecosystem services (Naumann *et al.,*2011).

Hubs are large areas that contain the greatest concentrations of the exceptional natural resources They anchor GI networks and provide an origin or destination for wildlife and ecological processes moving to or through it while their primary value and function is to preserve natural resources and provide ecological services, hubs can also support passive recreational activities (e.g., hiking, nature observation, hunting, and fishing) and sustainable resource-based economic activities (sustainable forestry, etc.) (Benedict & McMahon, 2002; LCPC, 2009). Hubs include reserves or large protected areas (national and state parks, wildlife refuges etc.), managed native landscapes (national and state forests, etc.), working lands (private farms, forests, etc.), parks and open space areas (public parks, natural areas, playgrounds, golf courses, etc.) (Benedict & McMahon, 2002; Williamson, 2003).

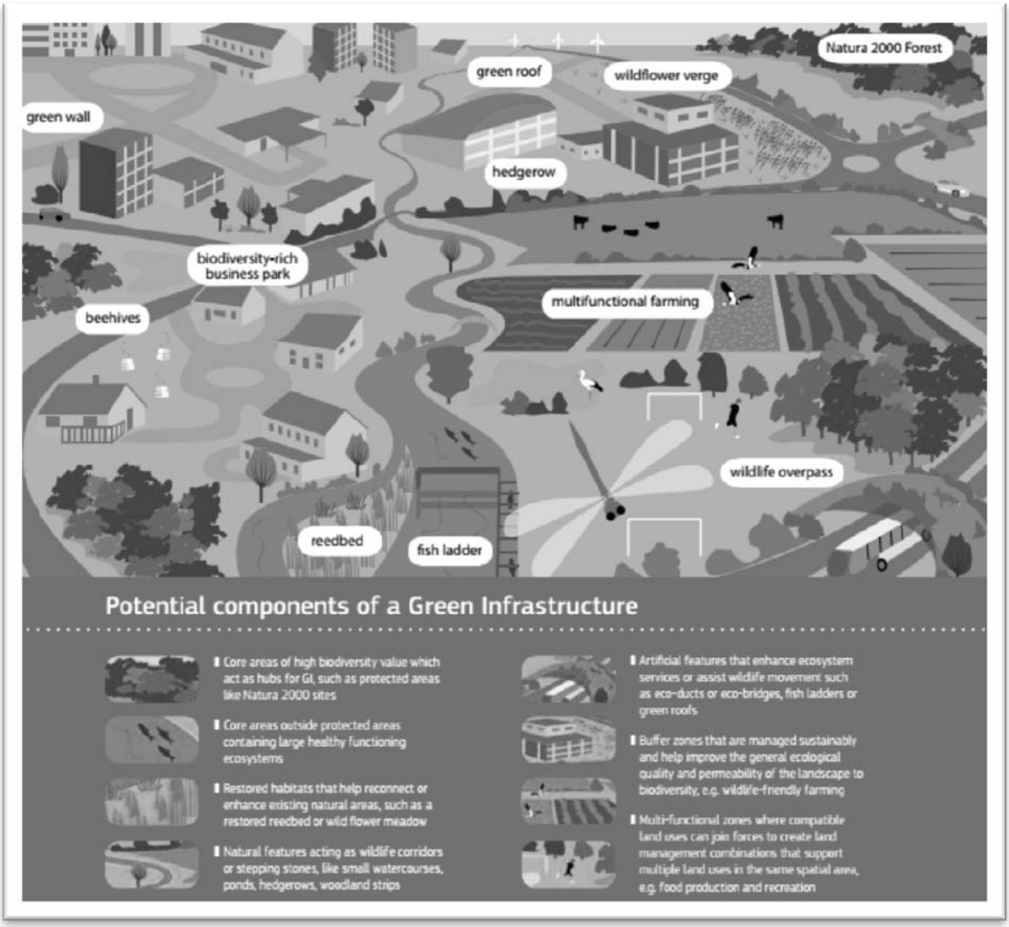

Figure 1. Potential components of a GI (EU, 2013).

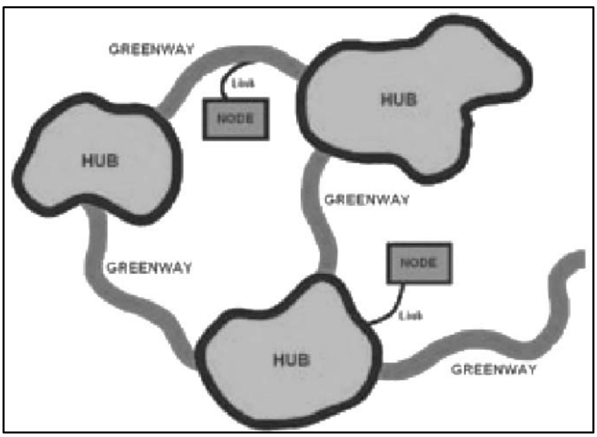

Figure 2. GI System Components (LCPC, 2009)

Greenways are linear "ribbons" that provide the major, countywide connections in GI system. They run between and through GI hubs and connect the hubs to interior of the urban and its major population centers, as well as to greenways in adjacent counties. Greenways generally correspond to major river and stream corridors (including adjoining natural resource areas such as floodplain, riparian vegetation, and steep slopes), although they may also follow upland features such as ridgelines. Greenways provide a variety of benefits, such as (LCPC, 2009).

Nodes range from localized and sometimes isolated occurrences of natural resources (e.g. woodland, wetlands, steep slope areas with natural vegetation, and species of concern habitat) to “managed” landscape features in more urban settings (e.g., parks, other “green” open spaces, and vegetated stormwater management areas). Nodes can provide a variety of benefits, such as water and air quality improvement, stormwater management, wildlife habitat, and recreation. While they can occur as isolated sites within surrounding agricultural or urban landscapes, their value to the GI system is enhanced when they are connected by greenways or links (LCPC, 2009)

Links are the connections that tie the system together and enable GI networks to work (Benedict & McMahon, 2002). They include both natural features (e.g., small stream corridors) and man-made features (e.g., trails within rights-of way). Similar to nodes they facilitate the flow of ecological processes as well as they provide a variety of benefits ranging from water quality protection and stormwater management to recreation, with an emphasis on connectivity (Williamson, 2003; LCPC, 2009). A promising type of GI link for the urban and suburban areas is the "green street". Green Streets achieve multiple benefits, such as safe connections for bicyclists and pedestrians, improved water and air quality and more livable communities, through the integration of stormwater treatment techniques which use natural processes and landscaping (LCPC, 2009; EPA, 2008).

GI system is made up of a wide range of different environmental features which can operate at different scales, from small linear features such as hedgerows or fish ladders or green roofs to entire functional ecosystems, such as intact floodplain forests, peat lands or free-flowing rivers. Each one of these elements can contribute to to GI in urban, peri-urban and rural areas, inside and outside protected areas. It is important however to be aware that not all green spaces or environmental features necessarily qualify to be part of GI. In addition to being of high quality they must also form an integral part of an interconnected GI network and be capable of delivering more than simply "a green space". An urban park inside a city, for instance, might well be considered an integral part of GI if it acts as a cool air corridor, absorbs excess water run-off and offers an attractive outdoor area for recreation and wildlife. On the other hand, a patch of uniform grass that contains no other environmental features is unlikely to qualify as GI. In rural areas, intensively managed farmland would also not normally form part of a GI network unless it were specifically managed in a way that supports local biodiversity or that encourages a more multifunctional land use which combines food production with other benefits, like recreation or water purification (EU, 2013). Finally GI system helps protect and restore naturally functioning ecosystems and provide a framework for future development (Benedict&McMahon, 2002).

GI system has many benefits from nature to people. These benefits are related to the environmental, social and economic. The main benefits of GI is as follows:

- Maintain or enhance natural ecosystem functions (Xiao& McPherson, 2002),
- Improve and support biodiversity (Goddard, Dougill & Benton, 2010), for example by reconnecting isolated nature areas and increasing the mobility of wildlife across the wider landscape (EU, 2013).
- Protect us against climate change and other environmental disasters, for example by alleviating floods, storing carbon or preventing soil erosion (EU, 2013). In

addition facilitate climate change adaptation (Gill, Handley,Ennos&Pauleit, 2007) and assist in stormwater management and flood alleviation (Ahern, 2007).

- Supply various solutions for water management (UNEP-DHI, 2014).
- Provide important green networks in increasingly urbanized cities (Mell, 2008).
- Reduce costs associated with urban heat islands (Bowler, Buyung-Ali,Knight, &Pullin, 2010; Soares *et al*., 2011).
- Contribute to advance urban sustainability in an array of environmental, social, and economic fronts (Kong, Yin, Nakagoshi&Zong, 2010).
- Increase land and property values (Conway, Li, Wolch, Kahle&Jerrett, 2008).
- Support the urban and rural economy (CA, 2006);
- Support the development of green industry (Schilling&Logan, 2008).
- Attract tourists (Kambites&Owen, 2006).
- It also offers potential social benefits such as improved health and well-being, culture, sport, and recreation opportunities, and a stronger sense of community (Kambites&Owen, 2006; Mell, 2007; Tzoulas *et al.,* 2007). In addition improve the accessibility of key recreational and green assets (CA, 2006).
- Foster a better quality of life and human well-being, for example by providing a high quality environment in which to live and work (EU, 2013).

The system is a successfully tested tool for providing ecological, economic and social benefits through natural solutions. It helps us to understand the value of the benefits that nature provides to human society and to mobilize investments to sustain and enhance them. It also helps avoid relying on infrastructure that is expensive to build when nature can often provide cheaper, more durable solutions (EP, 2013-URL 10).

CONTRIBUTION TO WATER MANAGEMENT OF GI SYSTEM

GI system is becoming increasingly recognized as an important opportunity for addressing the complex challenges of water management. The GI approach refers to the natural or semi-natural systems that provide services for water resources management with equivalent or similar benefits to conventional (built) “grey” water infrastructure (UNEP-DHI, 2014). GI has various solutions for water management. These solutions are related to water supply regulation, water quality regulation, and moderation of extreme events in water management (UNEP-DHI, 2014).

GI system has various solutions for water management. These solutions provide the following main contribution to water management. (UNEP-DHI, 2014):

Water supply regulation

- Increase/sustain (clean) water supplies by increasing the water infiltration and storage capacity of wetlands/soils and increasing recharge of aquifers.
- Mitigate droughts through the release of water during drought from natural storage features, including soil and groundwater, surface water and aquifers.

Water quality regulation

(for water purification)

- Purify polluted water from both point and nonpoint sources by trapping and/or containing sediments, pollutants in sediments, soils and vegetation (filtration and chemical conversion).
- Protect groundwater from contamination by removing sediments, heavy metals and other pollutants from the infiltration water.

- Relieve pressures on existing water treatment infrastructure via bioretention and infiltration practices that support water capture and infiltration, and slow down release of contaminants.
- (for erosion control)
- Stabilize and protect hill slopes, riverbanks and shorelines, thereby reducing erosion and associated pollution, and can bring additional biodiversity benefits and livelihood diversification options.
- Reduce sedimentation in reservoirs, channels and harbours by removing sediments from the inflow. This, in turn, preserves the functionality (e.g. flood control and/or water supply) of grey infrastructure (i.e. dams) and prevents additional costs for dredging.
- (for water temperature control)
- Reduce temperature of waterways affected by thermal pollution by providing shade.
- (for water biological control)
- Reduce pollution caused by pests, invasive species and waterborne diseases.

Moderation of extreme events (floods)

(for riverine flood control)

- Increase water storage capacity in watershed and urban areas and thus reduce downstream flooding.
- Reduce flow velocity of flood waters.
- Create space/room for the river (e.g. increase channel conveyance).
- (for urban storm water runoff)
- Reduce the risk of sewer overflow and contamination of water by facilitating infiltration and storage of stormwater, thereby minimizing excessive stormwater runoff.
- (for coastal flood protection)
- Reduce coastal (shoreline) erosion through creation of natural breakwaters that can absorb the energy of waves.
- Prevent saltwater intrusion by storing stormwater and reducing inundation.

Table 1 gives an overview of the GI system solutions relevant for water management, as well as conventional grey water infrastructure alternatives, all categorized across three overarching areas of water management issues. Solutions marked with “*” consist of built “grey” elements that interact with natural features and seek to enhance their water-related ecosystem services. GI system can help to water management as explained and listed below (UNEP-DHI, 2014).

In many communities, the initial impetus for developing sustainable communities and GI plan might be to manage stormwater and improve water quality, and the plan’s goals would naturally include improvement in indicators of watershed health. For example, the primary goal might be to eliminate combined sewer overflows or to have water clean enough to allow fishing or swimming in the community’s rivers, lakes, and beaches (EPA, 2014). GI system can especially contribute to sustainable drainage systems (SUDs) (LI, 2009). With SUDs GI encompasses a variety of technologies that replicate and restore the natural hydrologic cycle and reduce the volume of stormwater entering the sewer system. This, in turn, reduces overflows. GI system generally includes stormwater management methods that (LCGIP, 2011):

Table 1. GI system solutions relevant for water management (UNEP-DHI, 2014)

Water management issue		GI solution	Location: Watershed	Location: Floodplan	Location: Urban	Location: Coastal	Corresponding Grey Infrastructure solution
Water supply regulation		Re/afforestation and forest conservation	■				Dams and ground waterpumping Water distribution systems
		Reconnecting rivers to flood plains		■			
		Wetlands restoration/conservation	■	■	■		
		Constructing wetlands	■	■	■		
		Water harvesting*	■	■	■		
		Greenspaces (bioretention&nfiltration)			■		
		Permeable pavements*			■		
Water quality regulation	**Water purification**	Re/afforestation and forest conservation	■				Water treatment plant
		Riparian buffers		■			
		Reconnecting rivers to floodplains		■			
		Wetlandsrestoration/conservation	■	■	■		
		Constructing wetlands	■	■	■		
		Greenspaces (bioretention&infiltration)			■		
		Permeable pavements*			■		
	Erosion control	Re/afforestation and forest conservation	■				Reinforcement of slopes
		Riparian buffers		■			
		Reconnecting rivers to floodplains		■			
	Biological control	Re/afforestation and forest conservation	■				Water treatment plant
		Riparian buffers		■			
		Reconnecting rivers to floodplains		■			
		Wetlands restoration/conservation	■	■	■		
		Constructing wetlands	■	■	■		
	Water temperature control	Re/afforestation and forest conservation	■				Dams
		Riparian buffers		■			
		Reconnecting rivers to floodplains		■			
		Wetlands restoration/conservation	■	■	■		
		Constructing wetlands	■	■	■		
		Greenspaces (shading of waterways)			■		
Moderation of extreme events	**Riverine flood control**	Re/afforestation and forest conservation	■				Damsandlevees
		Riparian buffers		■			
		Reconnecting rivers to floodplains		■			
		Wetlands restoration/conservation	■	■	■		
		Constructing wetlands	■	■	■		
		Establishing flood bypasses		■			
	Urban storm water run off	Greenroofs			■		Dams and levees
		Greenspaces (bioretention&infiltration)			■		
		Water harvesting*	■	■	■		
		Permeable pavements*			■		
	Coastal flood (storm) control	Protecting/restoring mangroves, coastal marshes and dunes				■	Seawalls

- Infiltrate (porous pavements, sidewalks, and gutters; linear infiltration systems)
- Evaporate, transpire and reduce energy consumption (vegetated roofs, trees, planter boxes)

- Infiltrate and transpire (rain gardens and bioretention)
- Capture and reuse rainfall (rain barrels, cisterns, irrigation supply systems, and gray water systems).

GI system is an important component of many types of local plans at the neighborhood, city, and regional levels, including those for water resource management, sustainability, environmental justice, climate adaptation and resilience, hazard mitigation, and economic development (EPA, 2014a-URL 11). Also GI allows the development of effective policies that will guide the water management (EP, 2013-URL 10).

Extreme weather events and natural disasters (such as floods, landslides, avalanches, forest fires, storms and wave surges) due to climate change are the cause of billions of Euros of damage and insurance costs. The impacts of such events on human society and the environment can often be reduced using GI solutions such as functional flood plains, riparian woodland, barrier beaches and coastal wetlands that can be made in combination with infrastructure for disaster reduction, such as river protection efforts. Also GI solutions that boost disaster resilience are an integral part of the policy on disaster risk management (EP, 2013-URL 10) Thus GI system contributes to the prevention and reduction of water related natural disaster.

CONCLUSIONS

The availability and quality of water is significant concern because too much or too little can bring disasters. The water management approach for its multifunctional use is critical to whether or not positive or negative outcomes will result. Effective water management should promote "the coordinated development and management of water, land and related resources to maximize economic and social welfare without compromising the sustainability of vital ecosystems"(USACE, 2014-URL 8).

More specifically GI system, being a spatial structure providing benefits from nature to people, aims to enhance nature's ability to deliver multiple valuable ecosystem goods and services (EU, 2013). GI is based on the principle that protecting and enhancing nature and natural processes, and the many benefits human society gets from nature, are consciously integrated into spatial planning and territorial development (EP, 2013-URL 10).

GI system is becoming increasingly recognized as an important opportunity for addressing the complex challenges of water management. The GI approach refers to the natural or semi-natural systems that provide services for water resources management with equivalent or similar benefits to conventional (built) "grey" water infrastructure. Typically, GI solutions involve a deliberate and conscious effort to utilize the provision of ecosystem services to provide primary water management benefits. As a result (UNEP-DHI, 2014):

- GI solutions can be used to support goals in multiple policy areas (flood risk, support fish and wildlife and provide recreational, tourism benefits, etc.).
- GI solutions for water management are also at the heart of Ecosystem-based Adaptation.
- The capacity of GI to build resilience to climate shocks and variability has already proven to be effective in a multitude of cases around the globe.
- The growing interest in GI is being driven by a combination of factors, including the need to improve water management, owing to a growing demand for and a scarcity of

freshwater, and the increasing impact of climate change, including extreme events such as floods and droughts. Moreover, spatial planners, engineers and decision-makers are eager to identify and utilize cost effective, long term and environmentally appropriate infrastructure solutions.

Also other constituents of the system: "improved water quality; reduced municipal water use; ground water recharge; flood risk mitigation; reduced particulate pollution in water resources; reduced evaporation of water; supported water habitat; cost savings (potential cost savings compared to gray infrastructure) (Anonymous 2014-EPA).

One of the key attractions of GI is its ability to perform several functions in the same spatial area. In contrast to most "grey" infrastructures, which usually have only one single objective, GI is multifunctional which means it can promote win-win solutions or "small loss-big gain" combinations that deliver benefits to a wide range of stakeholders as well as to the public at large **(**EU, 2013).

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Chapter 36

LST Calculator: A Python Tool for Retrieving Land Surface Temperature from Landsat 8 Imagery

Hakan OĞUZ*

INTRODUCTION

Land surface temperature (LST) is a key parameter which plays an important role in many environmental studies (Xiao *et al.,* 2007). Urban heat island effect, global warming, enhanced green-house effects and other environmental problems have become crucial subjects to overcome in the last decades. LST retrieval using remotely sensed data is currently one of the most popular subjects in environmental studies during the last couple of decades with Landsat data.

Several algorithms have been developed by researchers to calculate LST but the most used ones are Split-Window (SW) algorithm, Single-Channel (SC) algorithm, and Radiative Transfer Equation (RTE) (Abrams, 2000; Cristóbal, Jiménez-Muñoz, Sobrino, Ninyerola, & Pons, 2009; Jimenez-Munoz, Sobrino, Skokovic, Mattar, & Cristobal, 2014; Jimenez-Munoz & Sobrino, 2003; Oguz, 2013; Oguz, 2015; Yu, Guo, & Wu, 2014; Sobrino *et al.,* 2007).

In this study, the radiative transfer equation-based method was employed due to the fact that it is easy to implement and it was also found to have the highest accuracy compared to SW and SC algorithms (Yu *et al.,* 2014). Landsat 8 data contains 11 bands ranging from 15m panchromatic to 100m thermal bands. Landsat 8 bands 4 (Red), 5 (NIR), and 10 (TIR-1) are the only bands required by the toolbox to calculate LST.

MATERIALS AND METHODS

Landsat 8 TIRS Bands

Landsat 8 satellite was launched in February 2013 for the continuity of remote sensing data at high spatial resolution in the Landsat Data Continuity Mission. Landsat 8 carries two instruments: The operational Land Imager (OLI) sensor along with multispectral bands 1-7 and 9 with 30 meters (except for band 8 which is panchromatic with 15m resolution) and the Thermal Infrared Sensor (TIRS) which collects data at a 100m spatial resolution with two bands (bands 10 and 11). Landsat 8 products are delivered as 16-bit images which enable better characterization of land cover state and condition.

The new TIRS have an advancement over the previous TM/ETM sensors by having two TIR bands in the atmospheric window between 10 and 12 μm (Jimenez-Munoz *et al.,* 2014). As illustrated in Figure 1 below, the previous single band has been split into two TIR bands which are now narrower than the previous TM/ETM TIR band. Further information regarding the sensor is presented in Table 1.

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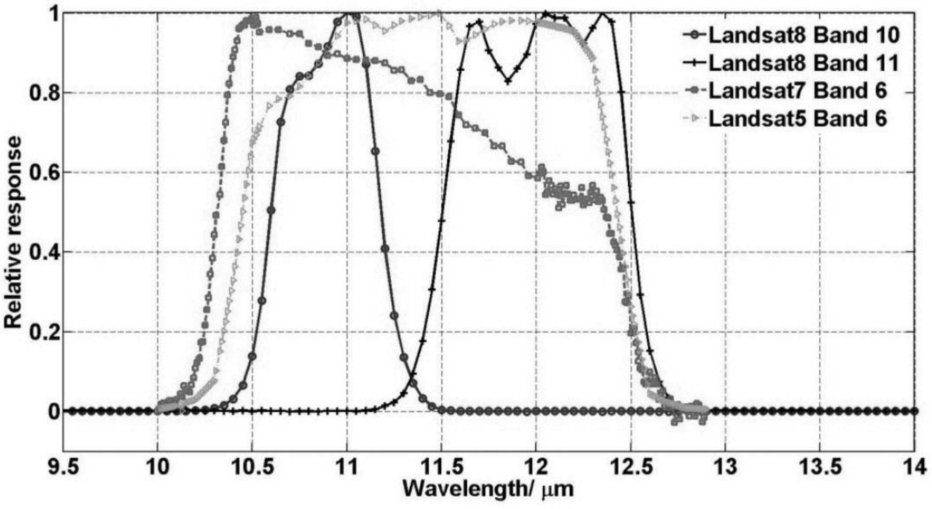

Figure 1: Spectral Response for thermal bands of different sensors (Source: Yu *et al.,* 2014)

Table 1: Characteristics of the Landsat 8 Data

Band No	Band Name	Band Width(µm)	Spatial Resolution (m)
Band 1	Coastal/Aerosol	0.435 - 0.451	30
Band 2	Blue	0.452 - 0.512	30
Band 3	Green	0.533 - 0.590	30
Band 4	Red	0.636 - 0.673	30
Band 5	NIR	0.851 - 0.879	30
Band 6	SWIR-1	1.566 - 1.651	30
Band 7	SWIR-2	2.107 - 2.294	30
Band 8	Pan	0.503 - 0.676	15
Band 9	Cirrus	1.363 - 1.384	30
Band 10	TIR-1	10.60 - 11.19	100
Band 11	TIR-2	11.50 - 12.51	100

(Source: Landsat 8 Data Users Handbook, 2016)

The Radiative Transfer Equation (RTE) Algorithm

The RTE algorithm retrieves LST (T_S) using the equation (1):

$$T_s = \left[\frac{c_2}{\lambda \, ln \left\{ \frac{c_1}{\lambda^5 \left[\frac{L_{sen} - L_u - \tau(1-\varepsilon)L_d}{\tau\varepsilon} \right]} + 1 \right\}} \right] \quad (1)$$

where T_s is the land surface temperature, ε is the land surface emissivity, L_u is the up-welling atmospheric radiance, L_d is the down-welling atmospheric radiance, τ is the atmospheric transmissivity, λ is the effective band wavelength, $c_1 = 1.19104x10^8 W\mu m^4 m^{-2} sr^{-1}$ and $c_2 = 14387.7\ \mu m\ K$ are the constants. L_{sen} is the thermal radiance at-sensor level and calculated by as follows:

$$L_{sen} = [\varepsilon B_{TS} + (1-\varepsilon)L_d]\tau + L_u \quad (2)$$

where B_{TS} is the spectral radiance (W/(m2 sr μm)).

The RTE method was selected and used in this particular study due to the fact that not only the model requires minimal and more accessible input data but also the procedure was found to be the least bias compare to other methods according to Yu *et al.,* (2014).

NDVI retrieval

Normalized difference vegetation index (NDVI) is a simple numerical index to assess the presence of live green vegetation. For Landsat 8 imagery, NDVI is computed using band 4 (RED) and band 5 (NIR) with the following Eq. 3:

$$NDVI = \frac{\rho_{band5} - \rho_{band4}}{\rho_{band5} + \rho_{band4}} \quad (3)$$

where ρ_{band5} stands for the spectral reflectance measurements acquired in the NIR band and ρ_{band4} represents the spectral reflectance measurements acquired in the RED band.

Afterwards, this NDVI file is used as an input to calculate Fractional Vegetation Cover (FVC) values as shown in Eq. 4 below (Skokovic *et al.,* 2014):

$$FVC = \frac{NDVI - NDVI_s}{NDVI_v + NDVI_s} \quad (4)$$

where $NDVI_v$ and $NDVI_s$ stand for NDVI values of full vegetation cover and bare soil respectively.

Emissivity retrieval

Emissivity is described as a proportionality factor, which scales black body radiance by Jimenez-Munoz, Sobrino, Gillespie, Sabol, & Gustafson (2006) to estimate emitted radiance. Therefore, emissivity is a vital role for the accuracy of land surface temperature retrieval. Several approaches have been proposed over the past decades to retrieve land surface emissivity from NDVI (Jimenez-Munoz *et al.,* 2006; Sobrino & Raissouni, 2000; Valor & Caselles, 1996; Van de Griend & Owe, 1993). In this study, Sobrino *et al.*'s (2008) land surface emissivity retrieval approach has been adopted (Eq. 5):

If $FVC = 0$ → $\varepsilon = 0.979 - 0.046 * \rho_{band4}$ (5a)

If $0 < FVC < 1$ → $\varepsilon = 0.971(1 - FVC) + 0.987 * FVC$ (5b)

If $FVC = 1$ → $\varepsilon = 0.99$ (5c) where FVC stands for Fractional Vegetation Cover, ε stands for land surface emissivity, and ρ_{band4} represents spectral reflectance for the RED band (band 4) of Landsat 8.

Any of the two thermal bands of Landsat 8 can be used in this study but Jimenez-Munoz et al. (2014) recommends Landsat 8 band 10 (TIR-1) due to its high atmospheric transmissivity. Therefore, band 10 has been employed in this study for the LST retrieval.

RESULTS

A Python Tool: LST Calculator

This program was developed using Python programming language (Python 2.7) and it can be run within ArcGIS Desktop, ESRI's complete GIS mapping platform. A request to get the tool can be made by contacting the author through his personal webpage at https://hakanoguz.wordpress.com. This toolbox consists of seven individual tools as illustrated in Figure 2 below: 1- TOA Radiance, 2- TOA Reflectance, 3- NDVI, 4- FVC, 5- Emissivity, 6- Lsen and 7- LST. The general flow diagram of the tool is given in Figure 3.

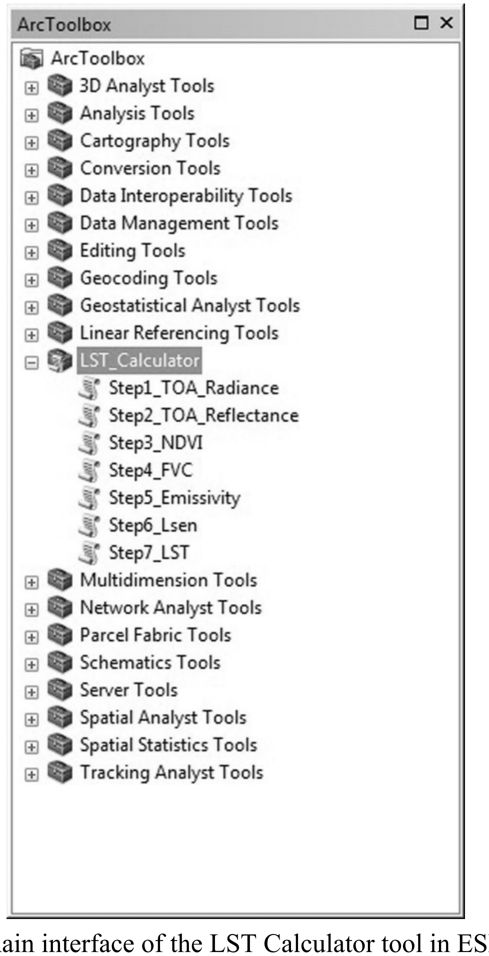

Figure 2: The main interface of the LST Calculator tool in ESRI ArcToolbox

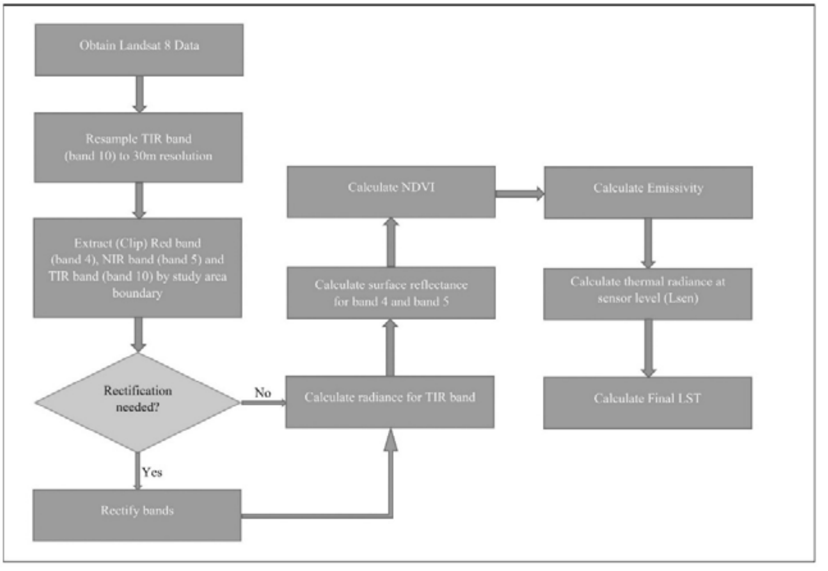

Figure 3: The flow diagram of the LST Calculator toolbox

TOA Radiance

At sensor Radiances for Landsat 8 bands are computed from following Eq. 6 (LDUH, 2016):

$$L_\lambda = (M_L * Q_{cal}) + A_L \tag{6}$$

where L_λ is spectral radiance (W/(M^2 * sr * μm)), M_L represents radiance multiplicative scaling factor for the band, A_L is the radiance additive scaling factor for the band, and Q_{cal} is pixel value in DN. These values are obtained from the metadata. Furthermore, Figure 4 illustrates the radiance calculation interface of the software tool.

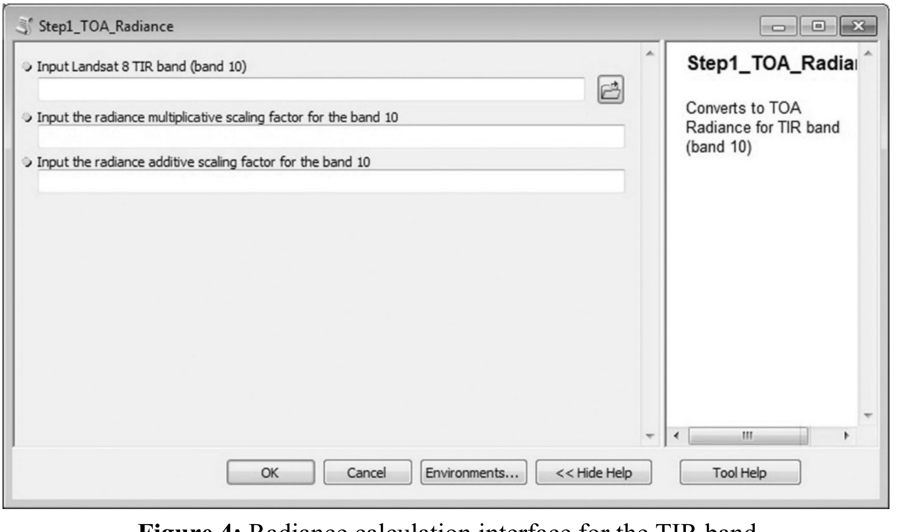

Figure 4: Radiance calculation interface for the TIR band

TOA Reflectance

After calculating at sensor radiances, planetary reflectances for the Landsat 8 RED and NIR bands (band 4 and band 5 only) are computed using the Eq. 7 (LDUH, 2016):

$$\rho_{\lambda} = \frac{M_p * Q_{cal} + A_p}{sin(\theta)} \tag{7}$$

where ρ_{λ} is unitless TOA planetary reflectance, M_p is reflectance multiplicative scaling factor for the band, Q_{cal} is pixel value in DN, A_p is reflectance additive scaling factor for the band, and θ is solar elevation angle.

Figure 5 below shows the planetary reflectance calculation interface of the program. This step requires four parameters: Landsat 8 RED or NIR band, reflectance multiplicative scaling factor, reflectance additive scaling factor, and solar elevation angle,

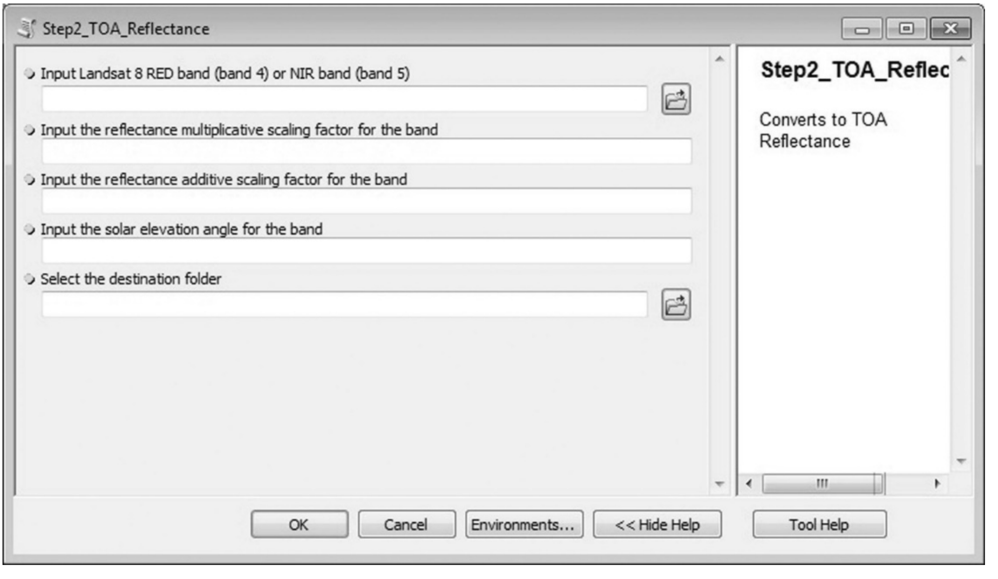

Figure 5: Reflectance calculation interface

NDVI interface of the tool is illustrated in Figure 6 below. This step requires RED band reflectance file and NIR band reflectance file only.

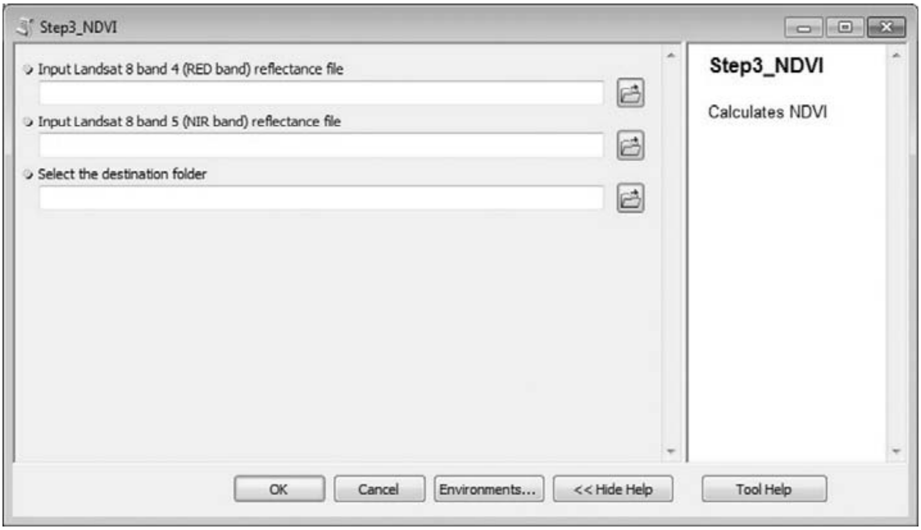

Figure 6: NDVI calculation interface

The FVC calculation interface is shown in Figure 7 below. In this step, the only band required is NDVI file.

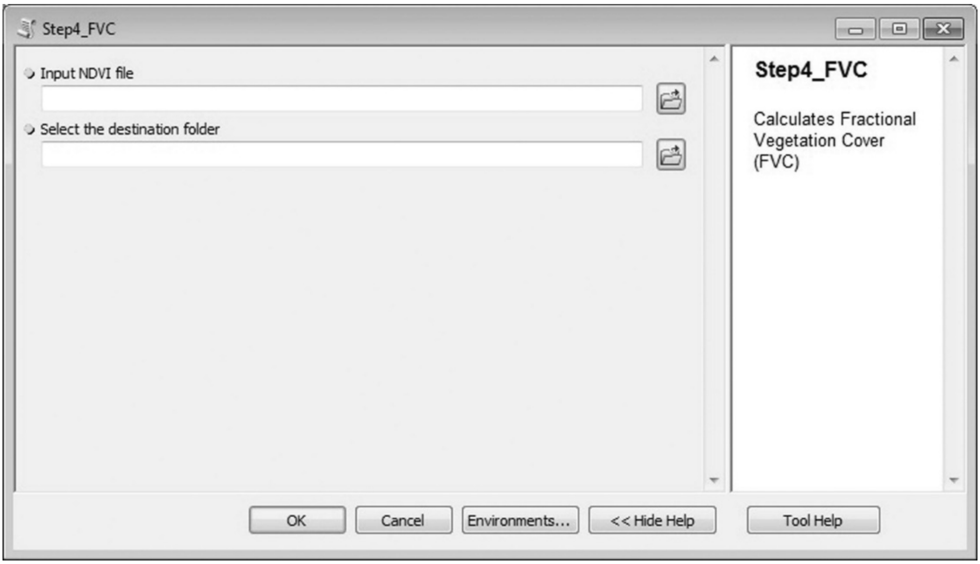

Figure 7: FVC calculation interface

The emissivity calculation interface is illustrated in Figure 8 below. This step requires only two parameters: 1- FVC file, and 2- Band 4 reflectance file.

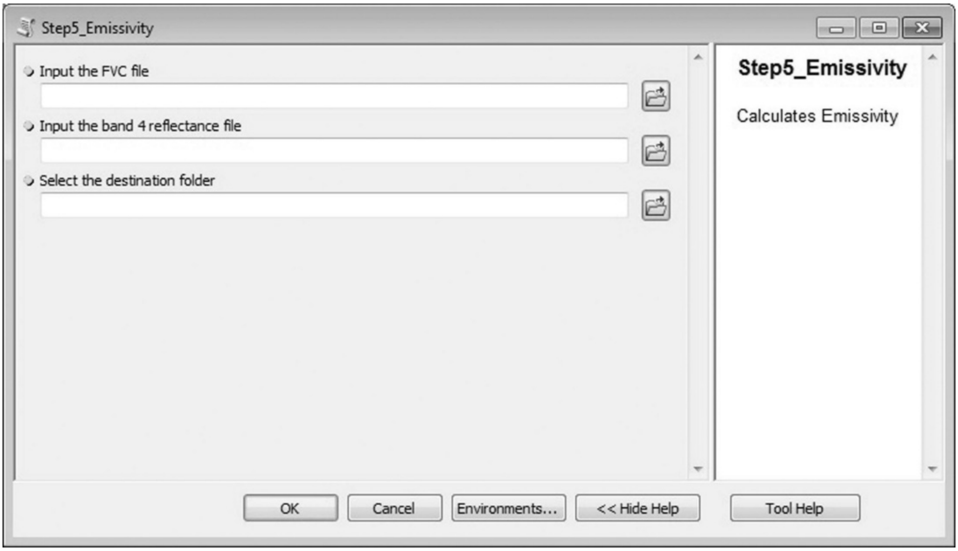

Figure 8: Emissivity calculation interface

The thermal radiance at sensor level (Lsen) calculation step requires five parameters: emissivity file, band 10 radiance file, down-welling atmospheric value, atmospheric transmission value, and up-welling atmospheric value, which can be obtained from Atmospheric Correction Parameter Calculator (ACPC) webpage (ACPC, 2016). The interface is shown in Figure 9 below.

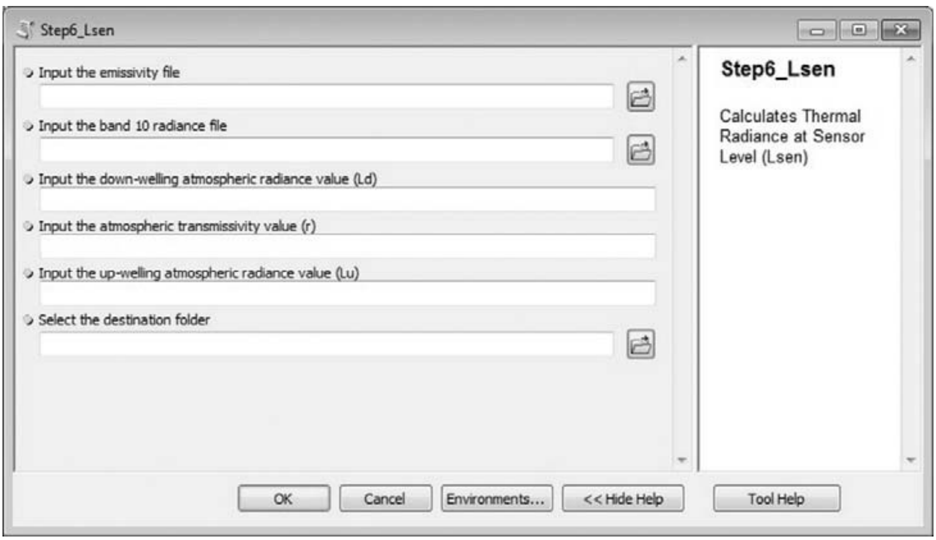

Figure 9: Thermal radiance at sensor level (Lsen) calculation interface

The final LST calculation interface requires emissivity file, the thermal radiance at sensor level file (Lsen), down-welling atmospheric radiance value, atmospheric transmission value, and up-welling atmospheric radiance value. The final LST calculation interface is seen in Figure 10 below.

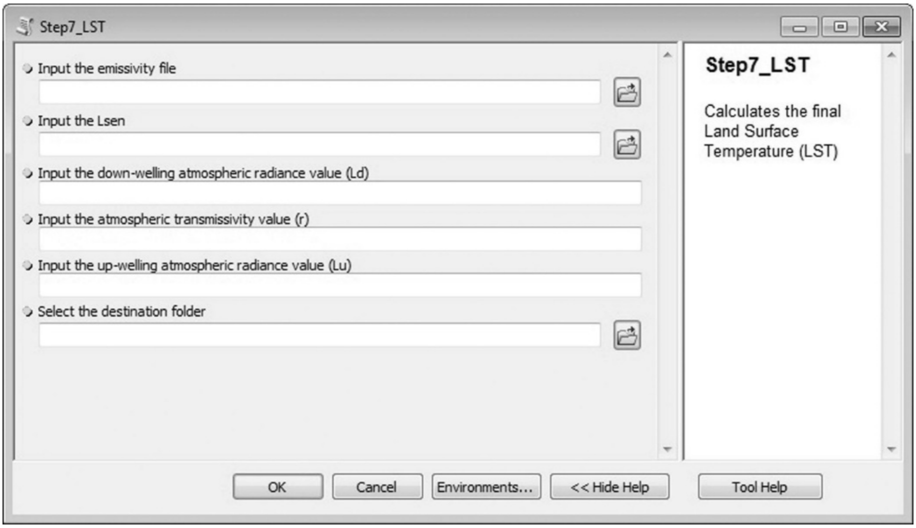

Figure 10: The final LST retrieval interface

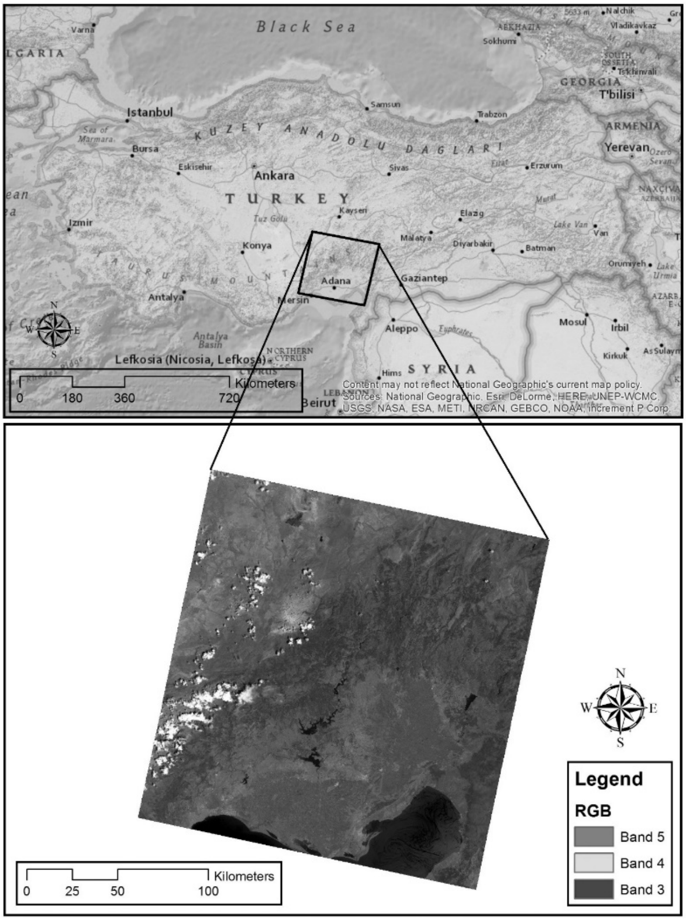

Figure 11: The sample Landsat 8 scene used in the demonstration

Software Demonstration

In order to demonstrate the LST Calculator toolbox, Adana, the fifth-largest city in Turkey has been selected as the study area as shown in Figure 11 above. Adana has witnessed a rapid development to become a metropolitan area and lies in the hearth of Cukurova which covers the cities of Adana, Mersin, Osmaniye, and Hatay. The region contains large flat fertile land that is regarded as one of the most productive areas of the world.

A Landsat 8 scene (path/row: 175/34), acquired on June 28 2014, was downloaded from Global Land Cover Facility website (GLCF, 2016). All the bands downloaded were resampled to 30m at GLCF except for panchromatic band that was distributed with 15m spatial resolution. The sample files and parameters used for demonstration are listed in Table 2 and Table 3 below.

Table 2: The sample files employed to calculate LST

File Name	Data Type	File Dimension (Row x Column)	Description
Band 4	TIF File	7591 x 7741	Landsat 8 RED Band
Band 5	TIF File	7591 x 7741	Landsat 8 NIR Band
Band 10	TIF File	7591 x 7741	Landsat 8 TIR Band

Table 3: The parameters used for the sample files

Parameter Name	Value
Atmospheric Transmissivity	0.79
Up-welling Atmospheric Radiance	1.80
Down-welling Atmospheric Radiance	3.01
Radiance multiplicative scaling factor for band 10	3.342×10^{-4}
Radiance additive scaling factor for band 10	0.1
Reflectance multiplicative scaling factor for band 4	2.0×10^{-5}
Reflectance additive scaling factor for band 4	-0.1
Reflectance multiplicative scaling factor for band 5	2.0×10^{-5}
Reflectance additive scaling factor for band 5	-0.1

The final spatial distribution of LST map was illustrated in Figure 12. The minimum and maximum temperatures of the scene were computed as -130 ºC and 38 ºC. As predicted, high temperatures were retrieved within dense urban areas (ranging from 31 to 38 ºC) while extremely cold temperatures were calculated for the cloud cover (from -130 to -3 ºC). If we exclude cloud cover, the lowest temperatures belong to water area ranging from 3.5 to 18 ºC, and forested areas have temperatures ranging from 23 to 30 ºC as shown in Figure 12 below.

DISCUSSION AND CONCLUSIONS

In this study, a Python toolbox was developed to retrieve land surface temperature from Landsat 8 imagery. This software can be an invaluable tool for those who are interested in thermal environment of earth's surface. This tool employs Radiative Transfer Equation algorithm for Landsat 8 and detailed information regarding the algorithm can be found in Skokovic *et al.*'s (2014) and Sobrino *et al.*'s (2008).

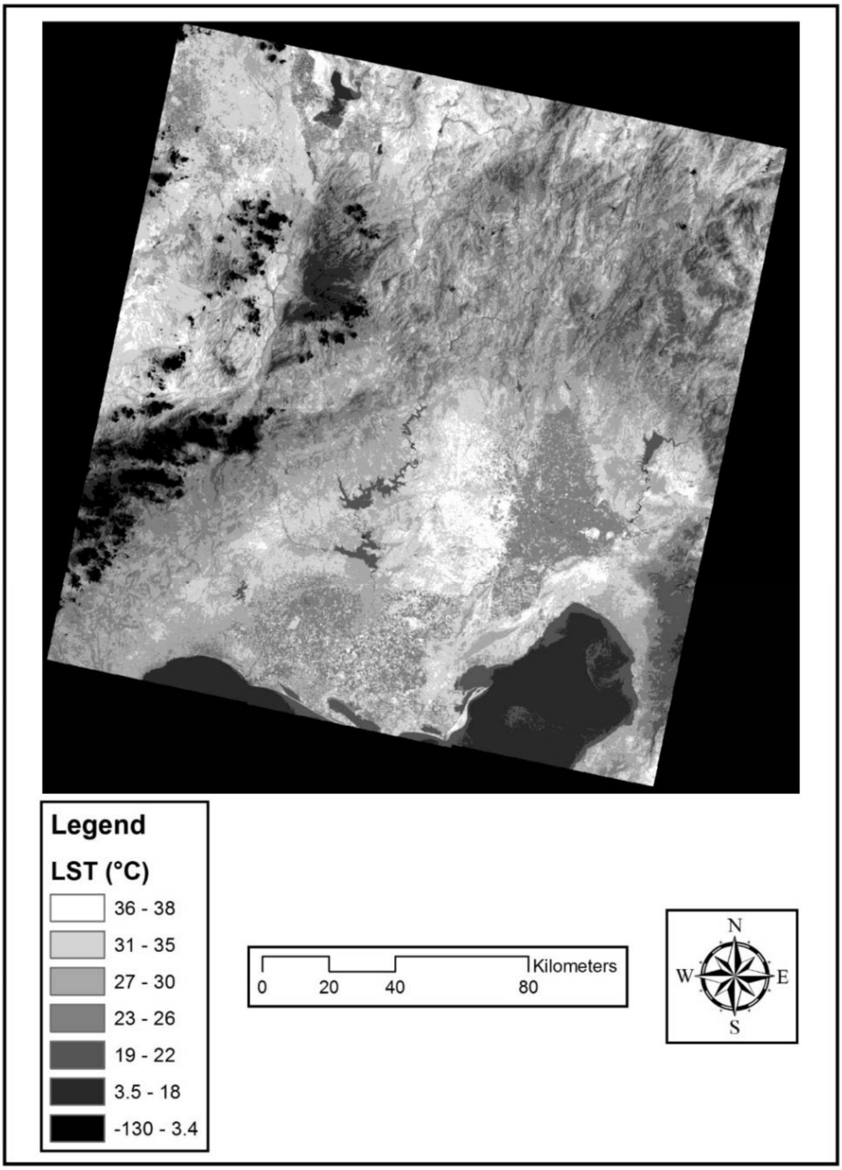

Figure 12: The spatial distribution pattern of land surface temperature

Furthermore, some atmospheric parameters are required prior to the calculation such as atmospheric transmissivity, up-welling and down-welling atmospheric radiances, which are essential to the retrieval of LST. These atmospheric parameters can be obtained from ACPC webpage (ACPC, 2016).

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Chapter 37

Determining the Recreational Potentials of Some of the Bays in Fethiye

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1. INTRODUCTION

The intense pace of city life and daily routine of modern people can create a lot of pressure on people. At this point, especially turning to natural areas relieves people in many ways. On the basis of recreation activities, corresponding to leisure activities of people, is need of them to feel more comfortable and peaceful.

Recreation is defined as the people's re-access to the impaired integrity by the activities they wish to live healthily and work productively (Kılıçaslan, 2008). In other words, activities done in free times in order to relax and regain vitality are often called as recreation (Gülez, 1990). Recreation areas can be defined as places where recreational activities are realized. While some recreation areas give services being designed and planned for this purpose (city parks, playgrounds, etc.), others allow for the realization of recreational activities with their existing nature (forests, coastlines, etc.) (Uzun, 2005). It is a known fact that a full compliance cannot be achieved between the living conditions in urban areas and the environment people are in search for (natural beauty, clean air, clean water, comfort, silence, freedom and so on). To maintain this balance, the person is in need of nature-based recreational activities (Akten, 2003).

The relationship between man and nature is subject to change as a result of rapid urbanization, and many natural areas are being destroyed. As a result of this, the number of the areas which can meet the recreational needs of urban people are decreasing (Onat, 1998). Areas located near the cities and within the forest regime are arranged as "resting places in forests" to meet the recreational needs of the people (Korkmaz, 2001). The cost-efficient nature of forestry recreation areas, transport facilities, recreation facilities and natural beauty are effective in increasing the demand for these areas (Uzun and Müderrisoğlu, 2010). Forest areas can also offer a combined use of an important part of natural resources, and provide people with positive contributions to people in physical and mental aspects (Akten & Akten, 2011).

A forest recreation area is "a place where various human activities related to outdoor recreation take place on the integrity of a forest or a forest track" (Aslanboğa and Gül, 1999; Akten, 2003). Benefiting from forests in a planned manner with those objectives started in 1956 with "Belgrade Forest", the first "forest recreation area facility". As of today, approximately 10 thousand hectares of forest were established as forest resting places in Turkey (Pak, 2004).

Fethiye, a district of Mugla province, has quite a rich potential in terms of natural

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resource values. In addition, the sea coast of Fethiye has led to the formation of many beautiful bays. In Fethiye, which is intensely visited by domestic and foreign tourists during the summer season, bays are especially the main areas preferred for primarily swimming and picnic. These bays also consist of Pinus brutia, Pinus pinea and larch forests reaching down to the sea. These bays, which are C-type recreation areas, are also forest resting places. C-type recreation areas are defined as recreation areas whose resource value and visitor potential are medium to low intensity in order to meet society's various recreational, entertainment and sports needs and to contribute to the beauty of the country and allow the tourist movement, and that have picnic units, exhibition and selling places for local products summerhouses and other recreational buildings and facilities in order to meet daily local needs (Anonymous, 2013).

For the establishment of use-protection balance in these areas, it is necessary to make recreational planning. In order to make the recreational planning, it is first necessary to determine the recreation potential of the respective areas. The purpose of this study is to determine the recreational potential of the bays of Küçük Samanlık, Büyük Samanlık and Kuleli, with a heavy use especially during the summer season by means of Gülez method.

2. MATERIALS AND METHODS

2.1. Material

Fethiye district, located in the southeast of the province of Mugla and in the western part of Teke peninsula, is bounded by the provinces of Denizli and Burdur to the north, Antalya to the east, Çağağzı, where Eşen creek flows into the sea, to the south and Kapıdağ peninsula to the west. Fethiye, is located in the southwestern part of Turkey between 36.17'33" north longitude and 29.15'45" east longitude. Its area is 3055 km2 and the coast length is 167 km. Küçük Samanlık, Büyük Samanlık and Kuleli bays, known as Oyuktepe bays and used heavily especially in the summer months as excursions, constitute the material of the study (Figure 1).

2.2. Method

In the study aimed to determine the recreational potential of Küçük Samanlık, Büyük Samanlık and Kuleli bays, The Gülez method was used. This method, developed in accordance with the conditions of our country by Gülez in 1990 and demonstrating the potential of recreational areas, can be preferred due to its convenience of application (speed and reliability). In many studies in this regard, the recreation potential of different areas have been calculated using the Gülez method.(Şimşek and Korkut, 2009; Yılmaz et al., 2009; Akten and Akten, 2011; Altunöz et al., 2014; Türker et al., 2014).

This method is executed in three stages. These stages are as follows;

- In the first stage of the study; examination, research, observation and photography processes were done on site in the bays.
- In the second stage of the study; data collection and literature review were made.

In the third stage, the Gülez method was applied in the light of the data collected. The Gülez method, which could easily allow for the detection of the outdoor recreational potential of forest recreation areas, is indicated by quite a practical calculation method. This calculation is expressed by the formula of “L + C + A + RC + NF = % RP”. The items in the formula and their potential scores are listed in Table 1.

“L” Landscape value: The most important factor in the assessment of the recreational potential of an area is the landscape potential of that place. Therefore, the landscape value took the first place in the evaluation by a weight of 35%.

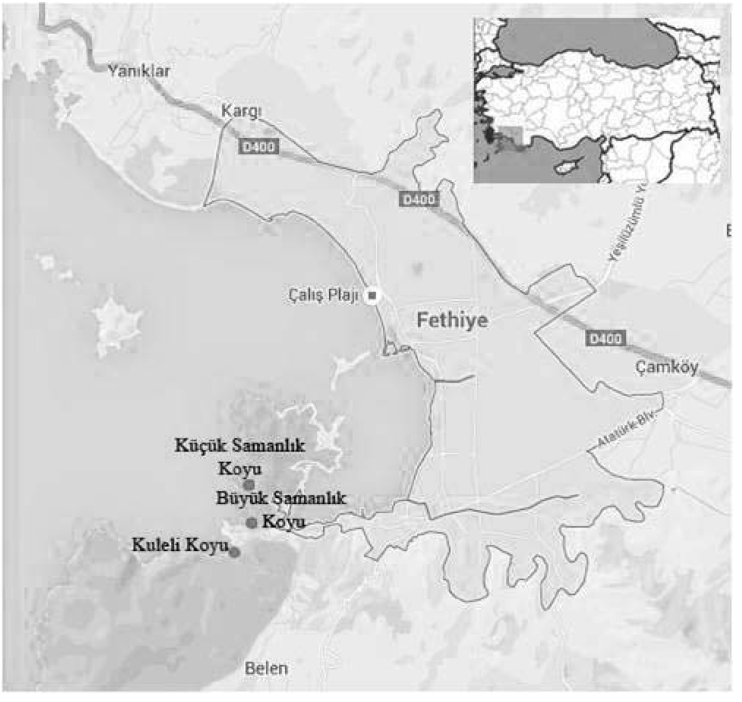

Figure 1: Location of the study area

Table 1: The items in the formula and their potential scores

Symbol	Description	Maximum Score (Item Weight Score)
L	Landscape Value	35
C	Climate Value	25
A	Accessibility	20
RC	Recreational Convenience	20
NF	Negative Factors	0 (Minimum -10)
%RP	Recreational Potential	100

"C" Climate value: Considering that climate has a large impact on recreational activities, the climate impact was deemed appropriate to be included in the assessment by a weight of 25%. The conditions of "Temperature", "Precipitation", "Sunshine" and "Windiness", as being the main elements of climate, have taken their place in the climate value by specific weights based on their impacts on recreation.

"A" Accessibility: the recreation potential of a place is only meaningful to the extent of accessibility to that place. In other words, the extent to which the people benefit from the place and ease of accessibility to that place increases the suitability of that place for recreation significantly. Therefore, the item of accessibility was included in the assessment method by a weight of 20 %.

"RC" Recreational Convenience: In the determination of recreational potential, all recreational facilities available in that area are also making a positive impact in the increase of recreational potential. Because, the fact that an area of woodland with beautiful views has facilities and recreational equipment such as picnic tables, fountains, toilets means attracting more and consistent visitors, and thus, increasing the recreational potential. Therefore, the item of recreational facilities was found most suitable to take a weight rating of 20%.

"NF" Negative factors: In the detection of the recreational potential of a place, it is necessary to keep in mind the current negative factors in that place. In the best case is, without a doubt, the absence of any adverse effects, that is, a place's taking zero negative points. In addition, it was also considered that there might be negative factors that can take a score of (-10) at most. The scores of negative factors are taken as minus (-) in the assessment, so, are subtracted from the total score (Gülez, 1990).

According to the results obtained from this method, an evaluation method has been developed as follows:

1. Forest recreational potential is very low (<30%)
2. Forest recreational potential is low (30% - 45%)
3. Forest recreational potential is medium (46% - 60%)
4. Forest recreational potential is high (61% - 75%)
5. Forest recreational potential is very high (>75%)

The weight score distribution of the factors used in the formula and the scores given to the bays are presented in Table 2 by utilizing the table prepared by Gülez (1990).

In light of the findings obtained in the last phase of the study, the recreation potentials of the bays were determined collecting the scores given for each bay, and various solutions were introduced.

3. RESEARCH FINDINGS

3.1. Climatic characteristics

Temperature; Mediterranean climate prevails in Fethiye-Göcek Special Environmental Protection Area. In the region; summers are hot and dry, winters are usually mild and rainy. Average annual temperature in Fethiye is 18.3 °C. The months with the highest average temperature are July and August, while the lowest are the months of January and February (Dinler, 2014).

Precipitation; Annual average total precipitation in Fethiye is 853 mm. 55% of the rainfall occurs in the winter, 19% in spring, 25% in fall and 1% in summer (Anonymous, 2012).

Sunshine; According to the measurements, the average value of sunshine duration in Fethiye is 8 hours 15 minutes. The intensity of sunshine in Fethiye (solar radiation) is 383.50 cal/cm2 /min in average. Sunshine is utilized in Fethiye in December at the least, and in July at the most (Dinler, 2014).

Wind; Dominant wind direction in Fethiye is East Northeast (ENE). The second dominant direction is West Southwest (WSW). Especially, there are virtually no North-South-direction winds. The fact that Fethiye is surrounded by high mountains determines the dominant wind direction. The same wind follows a flat trend during the year without seasonal changes. Average wind speed in Fethiye is 1.6 m/sec. Therefore, it is a very quiet location in terms of wind direction (Dinler, 2014).

Table 2: Assessment Form for Forest Recreational Potential (Gülez, 1990)

Items in the formula	Assessment Score			Features of the Item	Maximum Score	Description and Score
	Küçük Samanlık Bay	Büyük Samanlık Bay	Kuleli Bay			
Landscape Value (L)	2	1	2	Area of Land	4	Bigger than 10 ha, 4 points 5-10 ha 3 points 1-5 ha 2 points 0.5-1 ha 1 points
	7	7	8	Plantation	8	Woods, thickets, meadows 7-8 points trees and meadows only 6-7 points Bushes, meadows, sparsely wooded 5-6 points Meadows, sparsely wooded 4-5 points meadows and thickets only 3-4 points Bushes, sparsely wooded 3-4 points Meadows, sparse bushes 2-3 points Meadows only 1-3 points
	7	7	8	Seas, lakes, rivers	8	Seashore 7-8 points Lakeshore 6-7 points Riverfronts 4-5 points Creeks 1-4 points
	2	2	3	Surface condition	5	Flat area 5 points Slightly wavy 4 points Little inclined, partly flat places 3 points Slightly uneven 2 points Moderately uneven 1 point
	2	2	4	Visual quality	4	Panoramic views, 3-4 points Beautiful views and vistas 2-3 points Overall visual aesthetic value of the area 1-3 points
	1	1	2	Other Features	6	For example, natural monuments, waterfalls, caves, historical and cultural values; wild animals, birds and so on. 1-6 points

Table 2: Continued

Climate Value (C)	9	9	9	Temperature	10	0C Summer Months Average 16-17, 18-19, 20-21, 22-23, 24-25, 34-33, 32-31, 30-29, 28-27, 26-25 P: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10
	2	2	2	Rainfall	8	Total of Summer Months (Jun, Jul, Aug) mm 50-100, 150-200, 250-300, 350-400 1,2,3,4
	4	4	4	Sunshine	5	Summer months average cloudiness Cloudiness: 0-2, 2-4, 4-6, 6-8, 8-9 Score: 5, 4, 3, 2, 1
	2	2	2	Windiness	2	Less than 1 m/sec 2 points 1-3 m/sec 1 point
Accessibility (A)	4	4	4	Touristic Importance of the Area It is Located in	4	Mediterranean, Aegean, Marmara coastline 3-4 Black Sea coastline 2-3 Important roadroutes, priority regions for tourism 1-3
	2	2	2	Availability of a city having a population of at least 100,000 in the area it is located	5	Distance up to 20 km 4-5 Distance up to 50 km 3-4 Distance up to 100 km 2-3 Distance up to 200 km 1-2
	4	4	3	Arrival Time (from the nearby city with at least 5,000 inhabitants)	4	Up to 1 hour on foot or 0-30 mins by vehicle 4 0.30-1 hour by vehicle 3 1 -2 hours by vehicle 2 2-3 hours by vehicle 1
	3	3	3	Transportation (Except taxis and private cars)	4	Being able to walk or finding a vehicle easily 3-4 Finding a vehicle at certain times 1-3
	1	1	1	Other facilities of transportation	3	For example, cable car, accessing from the sea 1-3

Table 2: Continued

Recreational Convenience (RC)	3	3	4	Picnic Facilities	4	Fixed picnic table, cooker and so on. 1-4 (depending of the qualifications)
	2	2	2	Availability of water	3	Drinking and using water facilities 1- 3 (depending on the qualifications)
	-	-	-	Overnight Accommodations	2	Fixed overnight accommodations 2
	1	1	2	WC	2	Possibilities to making tented or tentless camps 1-2
	2	2	1	Car Park	2	Depending on the qualifications 1-2
	1	1	2	Buffet	2	Depending on the qualifications 1-2
	1	1	1	Watchman	2	Depending on the qualifications 1-2
	1	1	1	Other Facilities	3	Constant watchman/attendant 2 Attendant at weekends 1
Negative Factors (NF)				Air Pollution	-3	Depending on the level of pollution -1-3
				Being Secure	-2	Depending on the level of security -1 -2
				Water Pollution	-1	For seas, lakes and rivers -1
	-1	-1	0	Lack of maintenance	-1	Lack of adequate maintenance on the area -1
	-1	-1	-1	Noise	-1	Traffic, crowd etc. Noises -1
				Other Negative Factors	-2	For example, stone and gravel quarries, construction and factory residues etc. -1 -2
Grand Total (%)	61	60	69			

3.2. Results Related to the Recreational Potentials of the Bays

Küçük Samanlık, results related to the recreational potentials of Büyük Samanlık and Kuleli Bays, exhibiting forest resting place qualities and used as C-type recreational areas, are as follows: Fethiye forest showing the resting place of the property and also used as a C-type small promenade hay, large haystack, and the findings of the towers Coves recreational potential are as follows:

Figure 2: Images from Küçük Samanlık Bay

Küçük Samanlık Bay: Küçük Samanlık Bay, 3 km away from Fethiye, is located in the area called Oyuktepe bays, which are in the west of Fethiye city center. Open in the summer season, the bay is operated by a private company. Bay area is 4.1 hectares. The bay, which is a C-type promenade, is also a forest resting place. Küçük Samanlık Bay, connected to the Ministry of Forestry, has been leased to the private sector to provide services to tourism. Transportation to the bay is provided by minibuses or private vehicles moving from Fethiye town center. There are a sufficient number of facilities such as picnic tables, sitting units, showers and changing rooms, toilets which are provided by the private enterprise (Figure 2). The dominant vegetation consists of Pinus brutia, Pinus pinea forest and shrubs. According to the results of the evaluation; the landscape value of Küçük Samanlık Bay was given 21 points, climate value 17, transport value 14, recreational convenience value 11 and negative features are given -2 points. According to the results of the assessment, the recreational value of Küçük Samanlık Bay was high with a total score of 61 points.

Büyük Samanlık Bay: Büyük Samanlık Bay, 7 km away from Fethiye, is located in the area called Oyuktepe bays, which are in the west of Fethiye city center. Open in the summer season, the bay is operated by a private company. The bay area is 1.7 hectares.

The bay, which is a C-type promenade, is also a forest resting place (Figure 3). Transportation to the bay is provided by minibuses or private vehicles moving from Fethiye town center. Büyük Samanlık Bay, connected to the Ministry of Forestry, has been leased to the private sector to provide services to tourism. Arbors, beach chairs, changing rooms, WC and a restaurant serving one-day visitors are available in the bay area. According to the results of the evaluation; the landscape value of Büyük Samanlık Bay was given 20 points, climate value 17, transport value 14, recreational convenience value 11 and negative features are given -2 points. According to the results of the assessment, the recreational value of Büyük Samanlık Bay was high with a total score of 60 points.

Figure 3: Images from Büyük Samanlık Bay

Kuleli Bay: Kuleli Bay, 11 km away from Fethiye, is located in the area called Oyuktepe bays, which are in the west of Fethiye city center. Open in the summer season, the bay is operated by a private company. The bay area is 3.7 hectares. The bay, which is a C-type promenade, is also a forest resting place (Figure 4). The level of equipment in Kuleli Bay is sufficient. There are also units such as toilets, changing rooms, showers etc. According to the results of the evaluation; the landscape value of Kuleli Bay was given 27 points, climate value 17, transport value 13, recreational convenience value 13 and negative features are given -1 points. According to the results of the assessment, the recreational value of Kuleli Bay was high with a total score of 69 points. Kuleli Bay was found to be the one with the highest recreational potential.

4. RESULTS

Due to rapid industrialization and unplanned settlements arising from population growth in recent years, the people's utilization of natural areas for recreational purposes has also been increasing (Kaptanoğlu, 2010). Because of their touristic importance, Especially Mediterranean and Aegean coasts have been used more intensively. Due to this intensive use, destruction of natural areas in these areas may be experienced more. For this reason, these areas must be used in line with a correct planning and carrying capacity from the beginning rather than utilizing them randomly. The sustainable use of the recreational areas is dependent on maintaining the balance of conservation-use in a correct way. Forest areas, in particular, are the main areas used for recreational purposes not only in coastal regions but also in all the others. However, the indiscriminate and uncontrolled use of these areas can lead to degradation of forest areas over time.

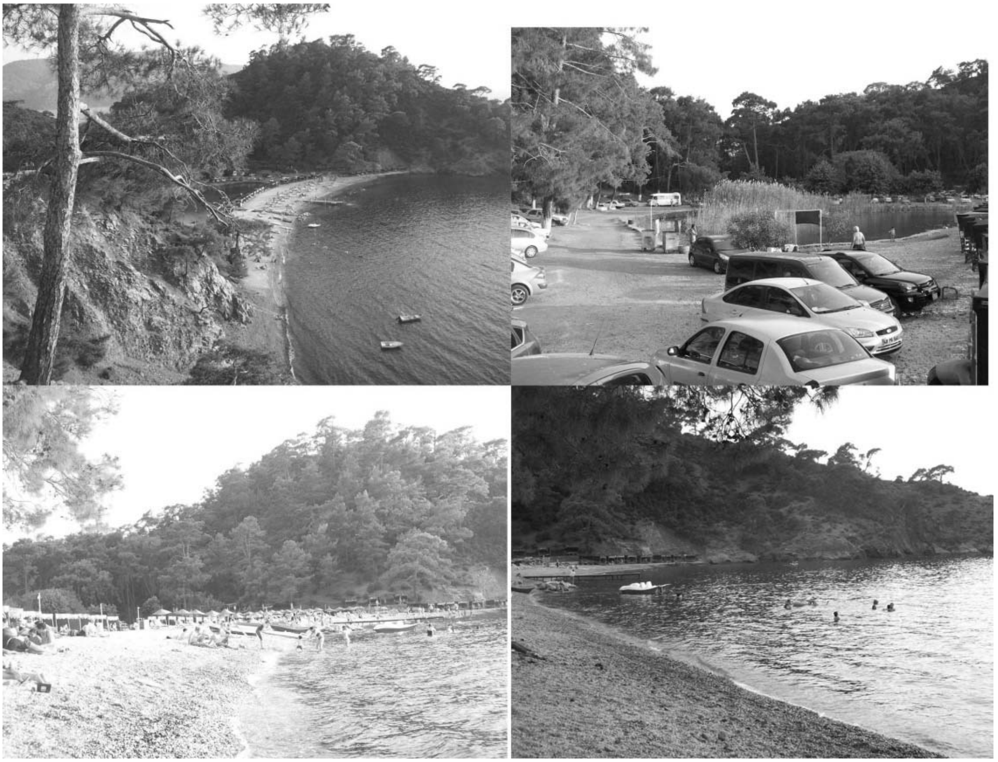

Figure 4: Images from Kuleli Bay

According to the evaluations, the recreational potentials in all the three bays were found to be on a high level. The most important factors here are the region's being by the sea, the climate properties and easy access to the bay. Consequently, when we make a general evaluation, important determinations for each of the bays can be summarized as follows;

- Küçük Samanlık Bay, as its location, comes before the other coasts. Because of its calm and clear water, this bay is a preferred one. In the bay leased to a private company by the General Directorate of Forestry, the required services required are provided by this private company. Küçük Samanlık Bay, turned into a more well-cared state with the landscaping works made in 2015, sometimes exceeds its carrying capacity. In this respect, it is necessary to calculate the carrying capacity in this area. Increasing the number of sitting units on the bay has enabled a more functional use. The parking problem is the most important issue for this bay. The sloping structure of the terrain and a large number of visitors lead to heavy traffic. Rather than random parking of vehicles within the bay area, it would be more appropriate to park them in the space allocated for the vehicles. Another of the problems in the bay area is the solid waste issue. For this purpose, the number of trash cans must be increased. Additionally, night lighting should be done a little better.

- Büyük Samanlık Bay is more comfortable for using thanks to the less uneven nature of the area. However, using the bay ordinarily without making any arrangements, poor maintenance of toilets and sitting units are two of the most negative features of this place. With the landscaping works to be made in the bay, a more optimal utilization of the bay, rather than an ordinary one, will be achieved.
- Kuleli Bay has gained a more functional form of the landscaping work carried out in 2015. Thanks to having a cleaner sea water and its equipment being more functional, compared with the other two bays, there is a greater demand for Kuleli Bay than the others. The most adverse situation for this bay is the issue of finding parking space for people coming with their private cars and the issue of heavy traffic.

It is dependent on planned running and maintenance that the potential of natural resource value get the value they deserve. While taking advantage of the natural beauties, ensuring the protection of these areas should be a priority task. Therefore, in areas with high recreational potential, an effective supervision mechanism should be established. The issues arising from the indiscriminate use of people could be solved by organizing these areas with landscaping in line with the natural structure. In this respect, to sustain the recreational potential in these frequently-used bays on a more efficient level, necessary landscaping work must be done and these areas must be used in accordance with their carrying capacity. Also, necessary controls must be made keeping them within the protection-use balance. Thus, in these bays will emerge a more efficient and sustainable use.

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Chapter 38

Investigation of Active Green Spaces within the Criterion of Earthquake Park Concept: Case Study of Safranbolu City

Yasin DÖNMEZ*

INTRODUCTION

Earthquakes have been a subject of research interest for various fields of science. The measures that should be taken before and after an earthquake have been among the most important subjects that the scientists have investigated. Similar to the other cases around the world, earthquakes continue to cause serious loss of life and property in Turkey. In order to contain possible damages, countries have taken necessary measures, including legal amendments in urban plans. However, it has been observed that these plans have not been adequately realized.

Urban plans design the physical space of the urban inhabitants in line with the demands of the people. However, the analysis of the urban plans reveals that these plans have not allocated gathering places in cases of disasters such as earthquakes or floods. The absence of the gathering places that will meet temporary shelter and other demands constitutes an important problem. In fact, open spaces, which have important functions for the architectural design and aesthetics of the urban areas, may play important roles after an earthquake.

Turkish Zoning Law (No. 3194, dated 1985) defines open spaces in terms of urban planning and categorizes these spaces into two groups: active open spaces and other open spaces. Active open spaces include the followings (Gedikli, 2002; Allan & Bryant 2010):

- Parks,
- Recreational Areas
- Playgrounds
- Amusement Parks
- Play fields
- On the other hands, other open spaces include the followings:
- Forest Lands
- Wooded Areas
- Maquis Shrubland
- Cemeteries

The concept of 'Green Area' refers to the surfaces covered or combined with woody or herbaceous plants. Such a definition entails that all green areas can be considered as open spaces, a proposal that may not work in certain cases (Akdoğan, 1987).

The concept of open space is one of the important elements of the urban texture

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and refers to the spaces other than transportation units, on which no buildings have been constructed. In physical terms, open spaces are the free unconstructed areas that are not permanently allocated for specific uses, but are temporarily used for different purposes (playground, exhibition, marketplace, etc.) (Yıldızcı, 1987; Çavuş, 2013; Özyavuz et al, 2016).

Active open spaces that have important functions in daily life may be used for gathering, air transportation, constructing temporary shelters, and stocking and distributing disaster recovery equipment after disasters.

Parks, which constitute an important share of active open space, have been used to construct temporary shelters, provide health service, distribute food, and to store disaster relief materials and other technical equipment before and after earthquakes. These areas, which have been determined according to the neighborhood plans, have crucial roles in order to maintain vital functions after earthquakes. However, there are serious problems about the planning and design of these areas for use in case of disaster. These areas should be connected to the main transportation network and obstacles that limit the connection should not be permitted. Since these areas have facilities such as toilets, fountains, lighting, and sitting areas, temporary shelters may easily be constructed over these areas, compared to other free areas (Orhon, 2002; İDMP, 2003; Kahyaoğlu, 2016).

Safranbolu district of Karabük province is one of the most important tourism destinations in Turkey. The city of Safranbolu is located at the first-degree seismic zone. Active fault zones that may produce earthquakes are the Karabük Fault at the north of Karabük province and the North Anatolian Fault System. The North Anatolian Fault System starts in Gerede, which is 55 kilometers away from the central district and passes from Eskipazar, İsmetpaşa and Tosya. In addition to these faults, a third fault passes from the cities of Amasra, Abdipaşa, Safranbolu, Karabük and Eskipazar (Gençoğlu et al, 1996; Kütükçüoğlu, 2012).

This study evaluates the existing situations of the parks in Safranbolu in order to determine whether they may be used as emergency sites after earthquakes. In this way, the study will determine the facilities that the parks of Safranbolu may provide in case of a potential disaster.

MATERIALS AND METHODS

The study is conducted in the city of Safranbolu. Safranbolu is the largest and the most developed district of Karabük province, which is located in Western Black Sea region of Turkey. The coordinates of the city are 41˚-16′ N and 32˚-41′ E. With its natural and cultural beauties, Safranbolu is one of the UNESCO World Heritage sites. The city attracts tourists throughout the whole year, thanks to its historical houses, baths, inns and natural beauties.

Safranbolu is located in a place that is suitable in terms of its distance to important centers. The distance of the city to Ankara and Istanbul is 217 and 385 km, respectively. Kastamonu is at the north of Safranbolu district whereas Bolu is located at its west. Table 1 shows the distance of Safranbolu city to important cities of Turkey.

The study has been conducted in three stages.

1st Stage: Review of the literature on the research subject

2nd Stage: Preparation of the form to be used in determining facilities that are essential for the usage of parks as earthquake emergency sites

3rd Stage: Evaluation of the parks according to the form prepared by the researcher.

Table 1: Distance of Safranbolu to Important Centers

Province	Distance	**District**	Distance
Ankara	217 km	Eskipazar	35 km
İstanbul	385 km	Eflani	48 km
Kastamonu	125 km	Ovacık	37 km
Bartın	87 km	Yenice	30 km

Based on the literature review, we suggested the form that is shown in Table 2. The form has been analyzed to evaluate the parks that are located in neighborhoods and the center of Safranbolu city. The form evaluates the following characteristics of the parks of Safranbolu.

Firmness of the Ground: The ground should be firm enough so that vehicles may enter, necessary goods may be supplied and temporary shelters may be constructed.

Open Space Area: The open space should be large enough so that temporary shelters may be constructed.

Slope: Slope should not be more than 6%

Distance to Transportation Networks: Parks should be close to the main transportation networks.

Amphitheater, Skate Park and Skate Rink: Amphitheaters are appropriate places to gather and make announcements after earthquakes; ramps of the skate parks may be used to transport necessary equipment and supplies; and skate rinks may be used as temporary morgues until the transfer of the bodies to cemeteries.

Play Fields: Basketball or football fields may be used for the construction of the field hospitals or temporary first aid centers.

Table 2: Required Facilities that Parks should have to be used as Earthquake Emergency Sites

Firmness of the Ground	Open Space Area	Slope	Distance to Transportation Networks	Amphitheater, Skate Park and Skate Rink	Play Fields

Adapted from Atalay, 2008; Çavuş, 2015; and Kahyaoğlu, 2016

FINDINGS

There are 39 parks that are located within the borders of Safranbolu city. Only 20 of these 39 parks, which were either city center or neighborhood parks, were evaluated within the scope of this research. Table 3 shows the research findings. The sign “X” indicates that the park is sufficient or has the necessary facilities to be used as earthquake emergency site whereas the sign "----" refers to the absence of necessary facilities that may be used for disaster management at the park.

The analysis of the parks in Safranbolu city shows that the parks have similar designs. The parks in the city center have outdoor fitness equipment with benches nearby (Fig. 1). Firmness of these parks were not designed for alternative uses, such as emergency site. Although the garden landscape design is appropriate, some of the parks have dense plants.

Table 3: Evaluation of the Facilities of the Parks in Safranbolu to be used as Earthquake Emergency Sites

Name of Park	Firmness of the Ground	Open Space Area	Slope	Distance to Transportation Networks	Amphitheater, Skate Park and Skate Rink	Play Fields
18 Mart Kent	----	X	----	X	----	----
2500	X	----	X	X	----	X
Ahmet Sarı	----	X	X	----	----	X
Barış Manço	X	X	X	X	----	X
Çetin Bilgiç	X	----	X	----	----	X
Diriliş	----	X	X	X	----	----
Dr. Miyazaki	----	X	----	----	----	----
Emek	----	X	X	X	----	X
Emirkent	X	X	X	X	----	X
Harmanlar	X	X	----	X	----	X
İsmail Lütfü Tansu	----	X	X	----	----	X
Japon	----	X	----	----	----	----
Babasultan	----	X	----	X	----	----
Mehmet Akif Ersoy	----	X	X	X	----	X
Özlem Ergül	X	X	----	X	----	X
Prof. Dr. İbrahim Gümüşsuyu	X	----	X	----	----	----
Sağlık	X	----	X	----	----	----
Tülbentçi	----	X	X	X	----	----
Umut	----			X	----	X
Safranbolu Merkez	X	X	X	X	X	X

DISCUSSION AND CONCLUSIONS

Earthquake emergency sites are highly important areas of the countries that lay on seismic belts. These parks may serve to prevent disorder that may occur after the earthquakes and to distribute the supplies in an ordered way. Such places should be planned specifically and designed by the experts of urban planning.

Since the industrial revolution, urban areas have been attraction centers with the opportunities of higher life quality and employment that they provide. Developing countries faced with the process of rapid urbanization and migration from rural to urban areas. In Turkey, migration to cities has increased dramatically since the 1950s and the country is facing with a remarkable increase in the share of urban population.

Unplanned urban development as a consequence of internal migration to urban areas has been associated with illegal housing in Turkey. Shanty towns built over the public lands significantly damaged urban open spaces. Consequently, urban open spaces cannot meet the demands of the increasing urban population. The share of open spaces, which have important functions for the cities, is decreasing day by day whereas their importance is rapidly increasing (Atalay 2008).

a

b

c

Figure 1a, b, c: Parks Design in Safranbolu

Parks, gardens of public and private institutions, stadiums and the hospitals are highly important places in terms of urban planning. An emergency group that consists of experts and local authorities should be organized and educated in order to use the parks as emergency sites after a possible earthquake. As such, necessary measures may be taken after the earthquake without a delay. Besides, these emergency groups should also include substitute personnel (Çavuş, 2015).

This study, which analyzed the parks in Safranbolu evaluated the conditions of 20 parks out of 39 parks. Of these 20 parks, only one park has the necessary facilities to be used as emergency site. Given the fact that the city has a population of 44.000, the existence of only one park to be used as earthquake emergency site is highly inadequate.

Emergency sites that are only considered following the earthquakes are ignored over time or the plans are not realized. Countries such as Japan and Canada, which were hit by massive earthquakes, place special emphasis on the planning and construction of the open spaces as emergency sites. In Turkey, there is no earthquake emergency site with all required facilities. The existing emergency sites have lost their functions due to neglect.

The facilities that should exist in a park that may be used after a possible earthquake are the followings:

1. Skate park

The ramps of the skate parks, which are used for entertainment and sports, may be used for loading or discharging supplies after a possible earthquake (Fig. 2).

Figure 2. Skate park

Figure 3. Open Spaces

Figure 4. Helipad

2. Open Spaces

Open spaces may be used for construction of temporary shelters or the first aid tents (Fig.3).

3. Helipad

Helipads may be designed to be used for air transportation in case the roads are destroyed by the disasters (Fig. 4).

4. Skate Rinks

Skate rinks may be used as temporary morgues that the bodies may stay until their transfer to the cemeteries (Fig. 5).

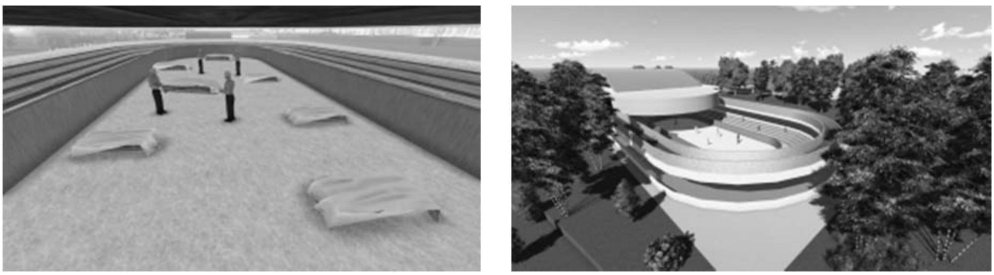

Figure 5. Skate Rink

5. Play Fields

In the case of a disaster or a crisis, play fields may be used for the construction of huge tents and field hospitals so that health services may be provided (Figure 6).

Figure 6. Play Fields

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Chapter 39

Utilization of Natural Materials as Mulching Materials in Landscaping Applications

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1. INTRODUCTION

Freshwater, which forms only a small portion of the total water on the surface of the Earth corresponds to the high amount of approximate 22.770 m^3 per person annually. However, despite this high amount per person, reason for the water problem is that water as a scarce resource is unstable in terms of time and place. While there is water surplus in Northern Europe, Canada or in areas where monsoon climate is dominating; there is a water shortage in dry lands and semi-areas of the world (ORSAM, 2013). In addition to this, climate changes expected to emerge due to global warming are expected to have a negative impact on water resources as well as in agricultural production. That is to say, water should be used planned and rational either for its efficient usage or its clean transition to next generations. However, water consumption is really high in plants used for botanical design used in landscape gardening studies. With watering, optimum development and homogenous appearance of plants is aimed (Orta, 2009).

Because water resources are scarce in today's world and 65-80% of the water is used for the purpose of watering in many fields, importance of efficient usage of water in watering has risen (Evsahibioğlu et al., 2010). Especially excessive usage of water in open green areas for the purpose of providing continuance to liveliness of plants has highlighted the importance of development of minimal water usage in landscape architecture (Barış, 2007; Tülek, 2008). In these designs named as Xerophilous Landscape Design, one of the most important criteria for efficient usage of water and decreasing the watering is mulching. Mulching does not only decrease the water usage but it also prevents the spring of weed and by preventing the extreme heat changes in soil keeps the temperature suitable for root growth.

2. DEFINITION AND FUNCTION OF MULCH

Mulching is to cover the surface of soil with either organic or inorganic materials in order to protect plant roots and soil from undesirable environmental factors. Usage of mulch is dwelled upon in order to create the proper conditions for plants growth, increase the soil temperature, preserve the humidity in soil, control the weed as well as harmful populations and also change the photobiology of the plant. (Farias-Larios, Orozco et al., 1994). March materials by effecting the radiation change rate on soil surface, decrease the water loss in soil and create different micro environment

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conditions for plants. Mulching is definitely necessary in many conditions in order to create permanent vegetation in degenerate areas and by that to secure the success of the improvement work. Mulch is defined as “any lifeless material placed on, close or in to the soil surface in order to protect soil from erosion, plants from heat, cold and drought” (Anonymous, 1979).

Purpose of mulching literally, while changing according to the material used, is to preserve the humidity in soil, decrease the weed growth, increase the soil temperature, prevention of pollution of products (flower, fruit) by touching the soil, development of field view aesthetic and establishment of water saving (Abak& Ertekin, 1985; Karataş, 1992).

We can list the functions of mulches as follows:

A. Control of Water Erosion

- Breaks down the kinetic energy of rain drops.
- Decreases the rain drop erosion.
- Decreases the dissolution in soil structure.
- Decreases the plunges in pores of soil surface.
- Decreases sheet erosion by increasing infiltration.
- Decreases rill and channel erosion.

B. Control of Wind Erosion

- Protects soil against detachment.
- Reduces wind speed on soil surface.
- Helps to keep soil humid.
- Decreases the movement of soil particles.

C. Protection of Water

- Decreases surface flow by increasing infiltration.
- Minimizes the vaporization on the soil surface.
- Increases relative humidity on the soil surface by limiting air movements.

D. Control of Temperature

- Increases temperature by absorbing solar energy or keeps it low by reflecting solar energy.

Mulching of soil surface prevents the germination of weed by preventing light transmission, decreasing soil temperature and affecting other physical features through creating a physical barrier. Even weeds germinate and reach to soil surface they can’t photosynthesize because the soil is covered with a light-proof material and that’s why they can’t survive. Allelopathic chemicals in mulch pressure the spring of weed. Weed pressure level is associated with potential residue. Hence groundcovers which create more biomass, leave more suppressor residue and increases weed pressure (Kalinova, 2010).

It’s especially stated that mulch also provides preservation of soil humidity (Küçükyumuk et al., 2013). Especially mulch materials in different colors create a micro climate for plants according to their colors. Compared to mulch-free surfaces, quality and quantity of calories reflected to the leafs from colorful mulches affects the behavior of pests as well as the temperature and humidity of root zone which can affect plant development and fruit yield (Liakatas et al., 1986). This effect of mulch color on pest population can decrease gradually due to progression of farming period and covering of mulch surface with growing leafs. Because of their feature of pulling or removing various pests, mulches in different colors have gained importance in preventing plants form virus diseases (Farias-Larioset al., 1994; Csizinszky, Schuster & Kring, 1995). In addition to this, conducted studies showed that there's an important negative exponential relationship between mulching ratio and land loss and it's determined that when the mulching ratio is increasing, land losses are decreasing. Also it's stated that there's a positive relationship between water loss occurs after surface flow and land loss and land loss increases parallelly to the increasing water loss (Aksakal, 2011).

Features of ideal mulch can be listed as follows (McDonald & Helgerson, 1990):

- It should be light-proof in order to prevent the development of harmful vegetation underneath it, it shouldn't be transparent.
- It should have a dark color in order to create a heat sufficient enough to prevent germination and shoot underneath it.
- It should be porous enough to infiltrate rain water underneath it from everywhere and still it should decrease the vaporization loss from the soil.
- It should have the thermal features that will maintain a proper soil temperature regime.
- Coniferous tree bushes should be invulnerable enough to not break down until its grown.
- It should be cost-efficient, light and easy to place.
- It should be in a matching color with the landscape.
- It shouldn't be toxic nor it should release toxic materials.

Mulch is neither fertilizer nor compost that's why it shouldn't be mixed with the soil. Very thick mulch implementation detains the humidity and causes roots to decay by not letting air in (Çorbacı et al., 2011). Many researchers state that phenology, yield and quality of some products can be changed with the effect of mulching. Effects of plastic mulch on soil temperature, surface heat and radiation balance are actually determined by the optic features of the material (Farias-Larioset al., 1994).

3.MULCH TYPES AND ORGANIC MULCHES

Various mulches and mulching techniques find a wide range of application areas in landscape restore, forestry and agriculture in today's world (Görcelioğlu, 1998). For this purpose organic and inorganic materials are used as mulch materials (Ekinci & Dursun, 2006; Küçükyumuk*et al.,* 2013). As inorganic mulch material; paper, aluminum foil, plastic (black, transparent, white, gray, red, yellow, brown, blue colored plastics) and various combinations of these are used. Among the artificial materials that can be used as mulch; organic and inorganic liquids that can be sprayed in order form a film layer, for example, latex and asphalt emulsions are present. Various plastic materials such as polytene (polyethylene) and polyvinyl chloride (PVC) can be included in these (Bache & MacAskill, 1984). Lately infra-red mulches meaning materials that pass infrared radiation started to be used (Preece& Read, 1993; Splittstoesser, 1990; Swiader, Ware & Collum, 1992).

As organic mulch material; chaff, fodder stems, dried muskeg mosses, shaving, sawdust, woodchips, shattered barks, leaf, mowed grass, animal fertilizer, compost, pebble, stone and brick breaches are used very frequently while various industrial products such as corncobs, peanut crusts, rice crusts, sugar cane residuals, sunflower seed hulls, and even cacao crusts are used as well (Preeceand Read, 1993; Splittstoesser, 1990; Swiader et al., 1992).

Some organic mulch materials are examined below (Görcelioğlu, 1998):

a) Chaff, fodder stems, dried muskeg bosses: They are generally the most affordable mulches. They give satisfying results in most conditions. They usually contain weed seeds and in some places seeds of fodders even contribute to the growth of weed. Also, in very dry air conditions, chaff can soak the humidity of soil and can cause insufficient germination. It can also cause nitrogen poorness in the soil.

b) Shaving, sawdust, woodchips, shattered barks: They contribute organic material to the soil and protect the soil surface. These materials which don't contain weed seeds resist more to the fire compared to chaff. Easy-to-implement chips and shattered carks can't be moved by wind. Shavings and sawdust can be dispersed in the wind. Also, these materials can cause nitrogen poorness in the soil. They can weaken the air transmission by getting stuck. They can be moved afloat in surface float. They can block the reach of rain to the soil.

c) Animal fertilizer: It can protect the soil surface and it contributes nutrients such as nitrogen, phosphor and sulfur to the soil. When used alone, it stays wet for a while and then gets dry. It can loose most of the nitrogen it contains with the evanish of ammonia.

d) Pebble, stone and brick breaches: These materials that can be efficient in certain areas are persistent and don't get disintegrate. Pebble and brick breaches with a diameter smaller then 2 mm are not a very useful mulch material because they are affected by wind erosion.

If a cover is asked for soil to preserve its humidity and maintenance of an unchanged temperature; chaff, shortly cut fodder stems and even ferns would make perfect mulch. Mulching in nature is provided by deciduous leafs in autumn. That's why cleaning and removing of deciduous leafs or dry bushes and ferns from soil surface in autumn are not a good application. The dead cover layer formed by these leafs not only protects plants from frost but it also gives back an important portions of the nutrients to soil by rotting and contributes the formation of mold.

Advantages of organic mulching can be listed as followed (Preece& Read, 1993; Splittstoesser, 1990; Rakow, 1994; Dursun & Ekici, 2006; Küçükyumuk & Kelen, 2013).

a) Preservation of soil humidity: Mulches decrease vaporization from the soil surface significantly. This can also slow down the movement of salts in the deepness of soil to the surface. With this aspect, mulch usage has a prohibiter effect on the formation of brackishness in soil.

b) Balancing of soil temperature: Organic mulches prevent the soil heat depending on their thickness. Hence, organic mulches have inhibition effect in soil heating spring months. In summer months, while keeping soil warmer organic munches also preserve the moisture content of soil and create a positive effect on plant growth and development. Organic mulches also decrease the negative effects of winter frosts on soil and roots.

c) Weed Control: Mulching is also effective on weed control. Mulching can prevent the growth of weeds and this way can decrease the competition between product and weed in terms of light, water and nutrition. 2 years old weeds and greases can't grow on most organic mulches.

d) Preservation and development of soil structure: Mulches protect the soil because they decrease the strong effect of irrigation and rain waters which get through soil. This way, duff layer can't be formed in soil and erosion rate falls. In addition to this, organic mulches enrich the soil by disintegrating and rotting during vegetation and help the regulation of soil structure. This is especially important in heavy soils (clayey, silt) in terms of regulation of soil structure. Also, disintegration of organic material provides a healthy airing in plant's root area in soils with good drainage. However, during the quick disintegration of organic material bacteria and fungi use much of the nitrogen. That's why, when organic material merges with soil, usage of extra nitrogenous manure is necessary.

e) Control of diseases and pests: Mulches don't eliminate plant diseases but they can't prevent the infections caused by touch of fruit to soil in diseased areas (Anonymous, 2004, Preece & Read, 1993). Mulches also decrease fruit rots and damages (Splittstoesser, 1990). It's determined that reflecting mulches (white and aluminum) reduce aphid infections in vegetables. Because soil humidity is controlled with mulches, spread of humidity depending fungus and bacterial diseases especially in plant-houses is prevented (Preece & Read, 1993).

Despite the advantages listed above, mulches can lose their features in short time due to their fast dissolution. Also, many of them can get scattered easily with wind. These types of organic mulches are usually implemented with cement. Chaff can contain the seeds of its original plant. Some of them have allelopathic features. This is an advantage on one side and a disadvantage on the other side. Against the weeds allelopathic feature is an advantage but the fact that it affects cultivated plants in the same way is a disadvantage (Kitiş, 2011).

While chaff, sawdust, woodchip, leaf, animal fertilizer and compost usage as organic mulch is very common in our country, usage of shattered barks is very common in Europe and America. For mulching usually shattered barks of abies, alder, spruce and pine are used. These barks get grinded in different heights and shapes and cover the vegetation surface. But in order to prevent toxic accumulation, tree barks shouldn't be taken from young trees. Despite the fact that tree barks used for mulching have a wide variety and colors; they are gathered into 3 main groups. These are; thickly-grinded for decorative purposes, granular-sized soil-looking and colored barks (Rakow, 1994).

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Chapter 40

Automated Land Surface Temperature Retrieval from Landsat 8 Satellite Imagery: A Case Study of Kahramanmaraş - Turkey

Hakan OĞUZ*

INTRODUCTION

Land surface temperature (LST) is described as the temperature of the earth's surface. It is one of the important parameters in climate change, evapotranspiration, urban climate, vegetation monitoring and environmental studies from local to global scales. With the help of remote sensing, it is possible to retrieve land surface temperature for large areas at sufficient temporal and spatial resolution rather than point data (Li *et al.,* 2013). Several methods have been developed to calculate LST from satellite imageries but single-channel (SC), split-window (SW) and radiative transfer equation (RTE) are the most popular ones among them. In the last couple of decades, many studies have been made on thermal analysis using MODIS, ASTER, Landsat TM and ETM data (Barsi *et al.,* 2003; Cristobal *et al.,* 2009; Jimenez-Munoz & Sobrino 2008; Jimenez-Munoz *et al.,* 2009; Oguz 2013; Oguz 2015; Li *et al.,* 2013).

In this study, RTE method has been used in ArcGIS Model Builder to retrieve LST from Landsat 8 satellite imagery. Users should input only band4, band5, and band10 and a couple of parameters and then the tool retrieves the final LST imagery automatically.

MATERIALS AND METHODS

Landsat 8 Data

Landsat 8 captures images of the earth every 16 day and can be downloaded free of change from USGS webpage. Landsat 8 has two sensors on board: the operational land imager sensor (OLI) and thermal infrared sensor (TIRS). OLI has 9 bands with 30m spatial resolution (except for panchromatic band) while the TIRS has two thermal bands with 100m spatial resolution as illustrated in Table 1 below (LDUH 2016). Having two thermal bands in Landsat 8 is the main improvement compare to previous versions of Landsat.

Study Area

Landsat 8 scene captured on 24 August 2014 with Path/Row: 174/34, that contains Kahramanmaras Province, was downloaded from the USGS (2016) webpage. Study area is illustrated in Figure1 below.

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Table 1: Landsat 8 OLI and TIRS bands

Band Number	Band Width	Description	Resolution (m)
Band 1	0.435 - 0.451	Coastal/Aerosol	30
Band 2	0.452 - 0.512	Blue	30
Band 3	0.533 - 0.590	Green	30
Band 4	0.636 - 0.673	Red	30
Band 5	0.851 - 0.879	NIR	30
Band 6	1.566 - 1.651	SWIR-1	30
Band 7	2.107 - 2.294	SWIR-2	30
Band 8	0.503 - 0.676	Pan	15
Band 9	1.363 - 1.384	Cirrus	30
Band 10	10.60 - 11.19	TIR-1	100
Band 11	11.50 - 12.51	TIR-2	100

Each Landsat 8 scene covers an area of about 185x185 km. Landsat 8 Path/Row: 174/34 was selected as our study area since Kahramanmaras Province is located in this scene. Kahramanmaras Province is located on the northeastern part of the Mediterranean region of Turkey.

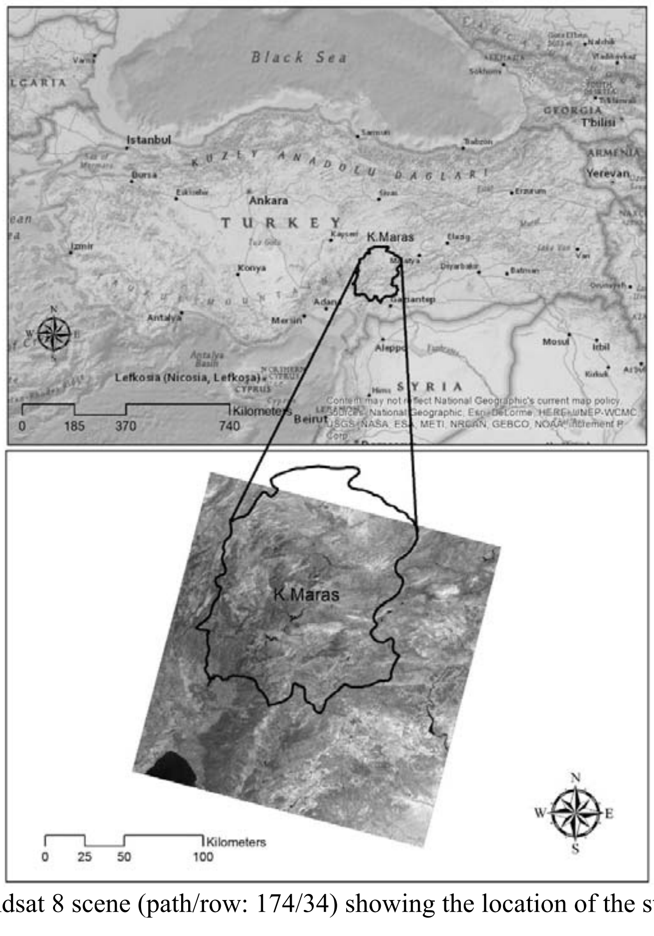

Figure 1: Landsat 8 scene (path/row: 174/34) showing the location of the study area

The average annual temperature is 16.9 °C and the annual precipitation is about 605 mm (TSMS 2016). The region has rich agricultural areas due to its optimal climate and fertile soils. Kahramanmaras province grew rapidly because of agricultural and industrial potential and thus the population has increased rapidly during the past five decades especially due to the migration from rural areas.

RTE Method

In this study, RTE method was employed due to the fact that it was found as the most accurate model by Yu *et al.* (2014).

$$T_s = \left[\frac{c_2}{\lambda ln \left[\frac{c_1}{\lambda^5 \left[\frac{l_{sen} - l_u - \tau(1-\varepsilon) l_d}{\tau\varepsilon} \right]} + 1 \right]} \right] \tag{1}$$

where T_s is the land surface temperature, λ is the effective band wavelength, l_{sen} is the thermal radiance at sensor level, l_u is the upwelling atmospheric radiance, l_d is the down-welling atmospheric radiance, τ is the atmospheric transmissivity, ε is the land surface emissivity, and c_1 and c_2 are constants.

$$l_{sen} = \left[\varepsilon B_{T_s} + (1-\varepsilon) l_d\right]\tau + l_u \tag{2}$$

where B_{T_s} corresponds the radiance of plank's law.

NDVI Thresholds Method

Land surface emissivity is calculated from Landsat 8 VNIR bands based on Fractional Vegetation Cover (FVC) for a given pixel (Sobrino *et al.,* 2008).

$$FVC = \left[\frac{NDVI - NDVI_s}{NDVI_v - NDVI_s}\right] \tag{3}$$

where $NDVI_s$ and $NDVI_v$ correspond to NDVI values for bare soil and vegetation respectively. Emissivity values were calculated based on FVC value as follows:

FVC = 0	ε = 0.979-0.04ρ_{red}
0 ≤ FVC ≤ 1	ε = 0.971 (1 - FVC) + 0.987 FVC
FVC = 1	ε = 0.99

where ρ_{red} corresponds to reflectance in the red band (Skokovic *et al.,* 2014). The flowchart of the model is illustrated in figure 2 below.

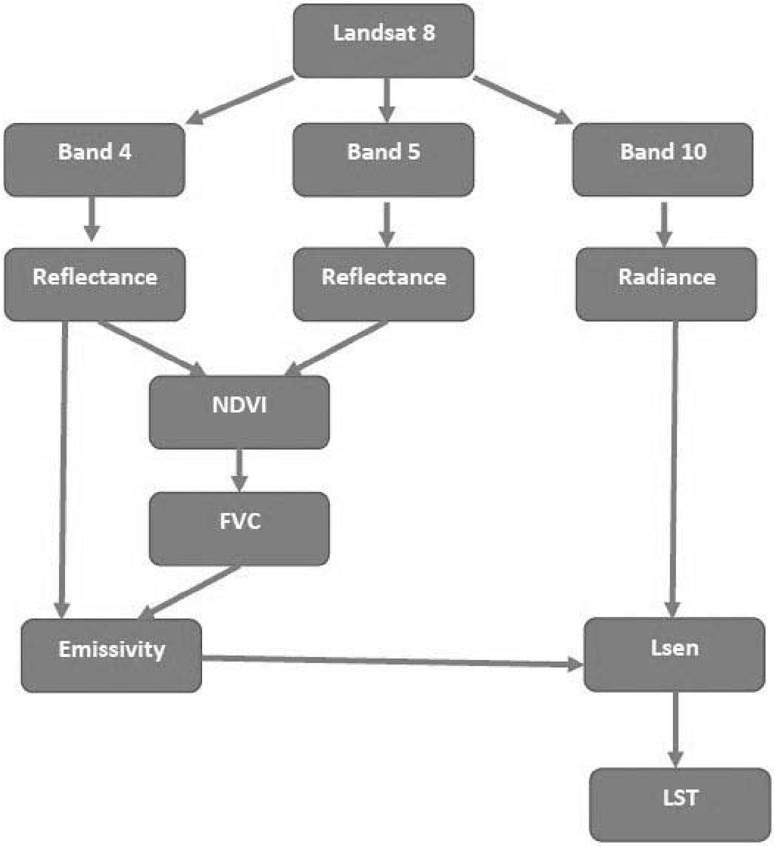

Figure 2: Flow diagram of the model

RESULTS

In this study, a model tool was developed using Model Builder in ArcGIS 10.3 to calculate land surface temperature from Landsat 8 imagery automatically as shown in Figure 3 below.

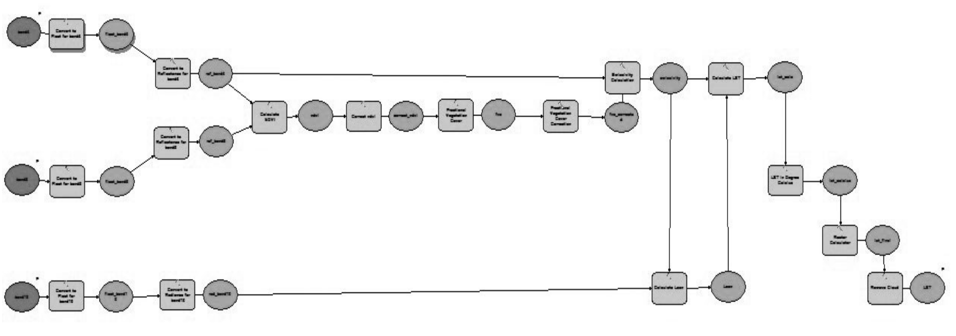

Figure 3: The model layout in ArcGIS Model Builder

The tool requires Landsat 8 band 4, band 5, and band10 only. For demonstration purposes, Landsat 8 scene with path/row (174/34) captured in August 24, 2014 was used in this study. As illustrated in Figure 4 below, only three bands (band 4, band 5, and band 10) are required to run the model successfully.

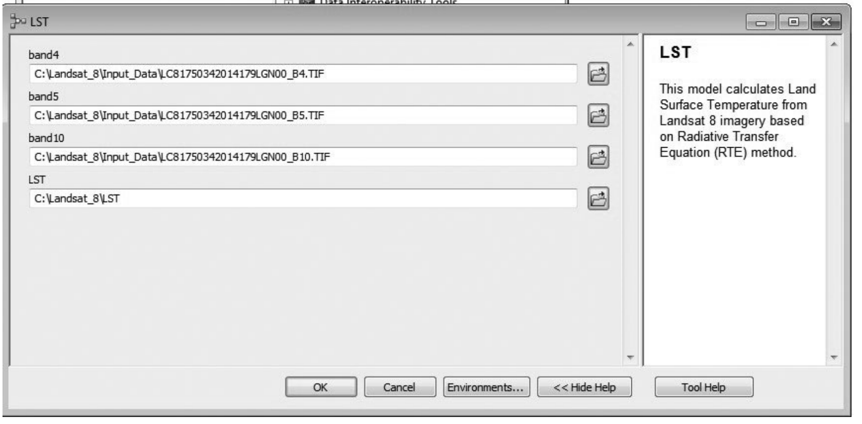

Figure 4: Input module of the tool

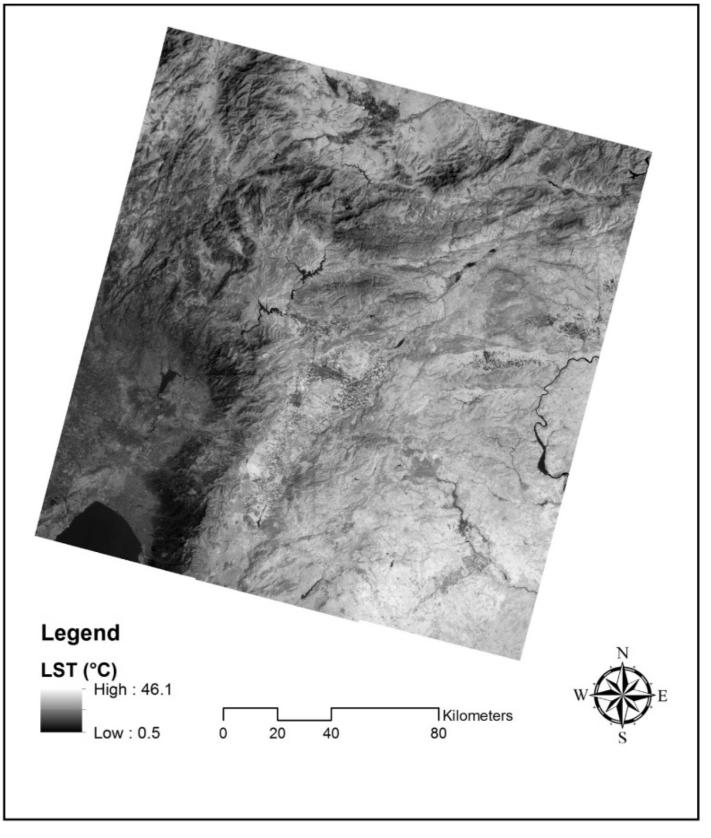

Figure 5: The final LST map

After inputting required bands into the LST tool, the final LST map is calculated automatically as seen in figure 5 below. The highest LST value was found to be 46 ℃ in the study area. Southeast corner of the scene was found to be the hottest parts due to the bare land/rock formation, and southwest corner of the scene was found to be the coolest because of the forest and sea.

The LST tool can also be integrated into the ArcGIS Toolbox as shown in Figure 6 below.

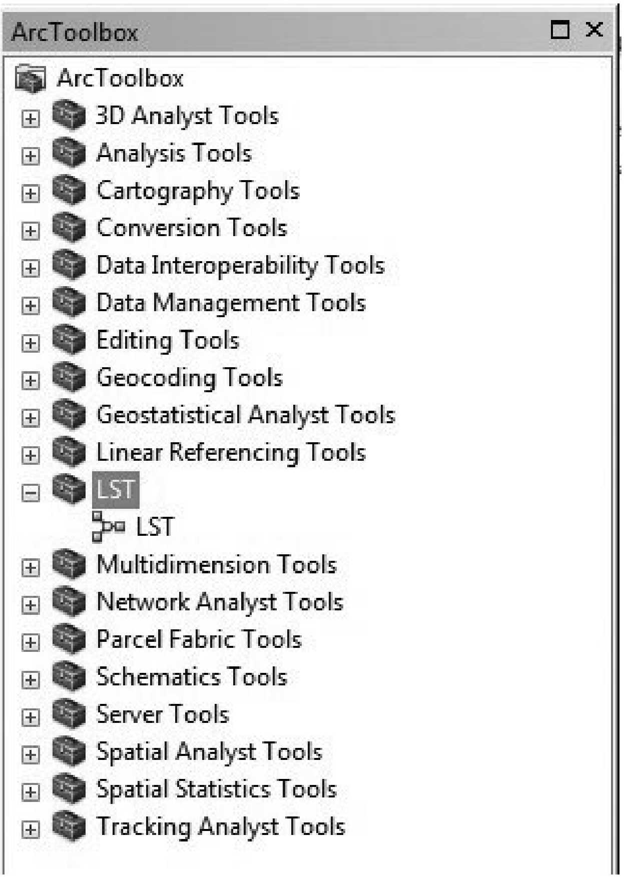

Figure 6: The LST tool integrated into ArcGIS ArcToolbox

CONCLUSION

The importance of LST is being increasingly recognized for thermal analysis. Accurate calculations of this parameter is an essential and challenging topic for the global change research. Therefore, the RTE method has been employed in this study because of the accuracy of the model compare to single channel and split window algorithms. The LST tool also makes the calculation process quite simple with the help of ArcGIS Model Builder. It is hoped that this tool will be useful to scientists or people interested in thermal analysis.

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Chapter 41

Identifying Land Use/Land Cover Dynamics in the Ahir Mountain, Kahramanmaraş, Using Multi-Temporal and Multi-Scale Satellite Imagery

Nurdan ERDOĞAN*, Hakan DOYGUN**

INTRODUCTION

Covering almost a quarter of the earth's surface and embracing a quarter of the world's human population, mountains are important globally (Thompson, Nagy, Johnson & Robertson, 2005). Mountain ecosystems are characterized by their topographic variety, climatic gradients, rich biodiversity, high plant endemism (Tovara, Seijmonsbergenb& Duivenvoordenb, 2013). They also provide ecosystem goods and services such as food, timber, fresh water, protection from natural hazards, carbon storage, and a range of immaterial functions for recreation and (Huber, Bugmann, Buttler, & Rigling, 2013). On the other hand, factors such as transhumance, tourism, recreation, hunting, grazing, agricultural activities, fires, and air pollution lead to irreversible destructions of mountainous areas (Lovett and Kinsman, 1990; Aytaç and Semenderoğlu, 2012). These issues are generally resulted with transformation ofland use and land cover (LULC), which threaten mountain biodiversity and ecosystem services.

LULC change is one of the prime driving forces of changes in the Earth system and climate in particular (Verburg, Neumann, & Nol, 2011), and effect the ability of biological systems to support the requirements of people and the central aspects of the Earth System functioning. Therefore it is of utmost importance to understand temporal LULC in order to guide management strategies for both human activities and potential conservation (Tovara, Seijmonsbergenb & Duivenvoordenb, 2013). Also, understanding the perception of LULC change and the adaptation strategies of different stakeholders is very important for the development and implementation of appropriate LULC policies (Ariti, van Vliet, & Verburg, 2015). Hence, timely and accurate change detection of the Earth's surface features is extremely important for understanding the relationships and interactions between human and natural phenomena in order to promote better decision making (Tasser, Ruffini, & Tappeiner, 2009).

Change detection is the process of identifying differences in the state of an object or phenomenon by observing it at different times (Zimmermann, Tasser, Leitinger, & Tappeiner, 2010). It involves applying multi-temporal remote sensing information to analyze the historical effects of an occurrence quantitatively and thus helps in determining the changes associated with land cover and land use properties with

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reference to the multi-temporal datasets. Remote sensing (RS) data have been one of the most important data sources for studies of LULC spatial and temporal changes. For more than 40 years, satellite images and aerial photographs have formed a strong basis for land cover classifications and change analysis (Shalaby & Tateishi, 2007).

The objective of this study is to detect and examine recent LULC changes in the Ahir Mountain, Kahramanmaraş, Turkey by using the post classification comparison technique, which is one of most widely used methods in change detection. Thus, the spatial pattern of changed areas was mapped and quantitative information was derived using cross-tabulation matrices for the period from 1986 to 2000 and from 2000 to 2013.

MATERIAL and METHOD

Study Area

The study area, Ahir Mountain, is situated within the boundaries of Kahramanmaraş province, in the Eastern Mediterranean Region of Turkey.

Figure 1. Study Area

The mountain is surrounded by the city of Kahramanmaraş, Menzelet and Sır Dam Reservoirs, and fertile alluvial plains.With the altitudes of ranging from 600 to 2300 m, Ahir Mountain is located between the Mediterranean and Irano-Turanian flora regions. The Mountain has rich natural structure and it is among the important plant areas in Turkey, with forests, high mountain steppes, and seasonal lakes (Kısakürek, Doygun, &Gözcü, 2014). Dominant species of the vegetation are comprised of the individuals of the Mediterranean phytogeographical region. There are three types of vegetation zones which are also shaped by human activities: Bush (500-1200 m), Forest (800-1200 m) and Alpine (1800-2100 < m) (Kısakürek, 1997; Bahadıroğlu, Akıncı & Kalkar, 2007). As a result of the destruction of Calabrian Pine (*Pinus brutia*) for many years, the bush formation is the formation in which mainly dispersed oak cover is dominant, which is composed of deciduous and evergreen bushes.

In coniferous forests, the dominant species is Calabrian Pine. Alpine formation appears over 2000-2100 m, which are also forest line, and sometimes from 1800-1900 m depending on the destruction of forests. In Ahir Mountain, nearly 122 endemic plant species are said to exist (Kalaylı, 2015).

The natural structure of Ahir Mountain is under pressure by human-driven effects. The fact that the mountain is close to Kahramanmaraş city causes ever-increasing dispositions in summer houses for recreational uses. Also, the use of high mountain steppes as forages by the countryside that lives on husbandry causes a gradual shrink on the expansion of some domain-specific species, and natural vegetation regresses due to pasturage pressure. The activities such as establishment of orchards and arable farming also cause significant pressures on natural environment, and the acreages of the transforming areas have been rising because of man-made activities.

Material

Ahir Mountain is the main material in this study. The city of Kahramanmaraş and surrounding farmlands situated close to the mountain have been excluded in order to clarify data obtained from the analyses. To detect and examine LULC change between the years of 1986 and 2013 in the Ahir Mountain, three remote sensing digital images (Spot 1 image of August 10, 1986, Spot 4 image of June 22, 2000 and Rapideye image of June 29, 2013) were used as satellite data set of study. Close dated images were used to minimise change detection error introduced by seasonal differences. To improve and verify the accuracy of the images, standard topographic maps and soil maps with a scale of 1/25000 were used in the study as ancillary data set. During field studies/ observations, Global Positioning System (GPS) was used to determine and collect ground control points as reference for supervised classification process.

ArcGIS 10.0. software was used in data analysing, ENVI 4.7 and ERDAS IMAGINE 9.0 software was used for image processing and change detection, Salford Predictive Modeler v7 CART package was used to build classification tree and Google Earth™ v. 7.1 mapping service images was used to help determine the accuracy of the classification.

Method

To determine and analyze LULC change between the years of 1986 and 2013 in the Ahir Mountain, post-classification-comparison technique has been used. The flexibility of the post-classification comparison techniques to use images of different spatial and spectral resolutions acquired by different sensors made a successful change analysis possible (Alphan, Doygun, & Unlukaplan, 2009). The post-classification-comparison technique, using seperate classifications of images acquired at two different dates, can generate different maps with 'from–to' change information that is easy to interpret (Peiman, 2011). Although the accuracy of the change maps is depend on the accuracy of the individual classifications and is subject to error propagation, the classification of each date of imagery builds a historical series that can be more easily updated and used for applications other than change detection. Also, the post-classification comparison approach compensates for variation in atmospheric conditions and vegetation phenology between dates since each classification is independently produced and mapped (Aguirre-Gutiérrez, Seijmonsbergen & Duivenvoorden, 2012; Yuan, Sawaya, Loeffelholz & Bauer, 2005).

During image pre–processing, image georeferencing and enhancement were done. In the study, images have been geo-referenced to UTM WGS 84 system using image to image registration method. Ground control points used for the registration process were selected according to their homogenous distributions and legibility on images. All images were georeferenced by using the same control points. Root Mean Square Error (RMSE) which is a good assessment of the transformation's accuracy, were not bigger than 0,63 pixel for images. After correcting all images, geometrically image enhancement has been done by Gaussian method.

Supervised classification in which the image pixels are classified to various predefined land use/land cover classes based on the spectral reflectance values at different bands is most important task in the study. In the study “arable land, permanent crops, sparsely vegetated areas” and “bare rock, high mountain steppe” classes had very close spectral reflectance values and therefore they overlapped in the feature space. This caused spectral confusion among the classes and resulted in inaccurate classified images. Because it was difficult to classify these classes correctly using traditional parametric classifier like Maximum Likelihood Classifier in the study decision tree classifier was used.

Decision tree is one of the current widely used machine learning models, its theoretical basis is “inductive learning method”. The algorithm can extract decision rules or generate decision tree by inductive learning from the training samples without order and rules and then use the decision rule or decision tree to classify new data (Alphan, Doygun, & Unlukaplan, 2009). There are many advantages to the use of decision trees for classification. Decision trees certainly are easy to use and efficient. Rules can be generated that are easy to interpret and understand. They scale well for large databases because the tree size is independent of the database size. Each tuple in the database must be filtered through the tree (Lu, & Yang, 2009). There are several well-established decision tree classifier algorithm e.g. C4.5 (Quinlan, 1993), Classification and Regression Trees (CART) (Breiman, Friedman, Olshen & Stone, 1984) (Loh, 2014). Because CART algorithm has the advantages of clear structure and easy implementation and can effectively deal with huge amounts data and high dimensional data, as to input data, there has no statistics distirubion requirements, in the study CART algorithm was used (Geng, Guo & Ye, 2014). Classification results visually by on-screen digitizing were edited to eliminate misclassification errors. On screen digitizing was carried out for specially urban fabric and arable lands.

To compare different resolutions of the images from different sensors, the classification results were resampled to 20 m to match the coarse map (1986 image). Post-classification change analyses were employed to quantify LULC conversions in two intervals from 1986 to 2000 and from 2000 to 2013. Classified image pairs of consecutive years were compared using cross-tabulation (Shalaby & Tateishi, 2007).

RESULTS

In the study, LULC classes were classified in second and third levels depending upon LULC structure, and the features of the study area and satellite images, the observations carried out in the research area, previous studies and expert opinions by taking European Union CORINE Land Cover Classification System as the reference. Moreover, the In-valley plants and high mountain steppes classes, which have significant places in terms of the landscape character of the research area and biodiversity but do not have direct equivalents in CORINE Land Cover Classification, are included in the classification. Accordingly, the LULC classes which were found in the research area are determined as in the Table 1.

According to the classification results, sparsely vegetated areas were the most dominant LULC class in the study area (Figure 2). The high mountain steppe which occupies a great area is another LULC class. The agricultural activities are the most dominant of the human uses in the study area. It is seen that the permanent crops area which is composed of vineyards and orchards, covers a huge section like around a quarter of the study area.

Table 1. Definitions of LULC classes used in the classification

Level	Class Name	Definition
1.1	Urban Fabric	Highly developed building islands in the city core, areas open for residential development at the urban fringe, roads and other built-up or paved-over areas
1.3.1	Mineral Extraction Sites	Areas with open-pit extraction of construction material (sandpits, quarries)
2.1	Arable Land	Cultivated areas specially with cotton, corn, wheat, etc.
2.2	Permanent Crops	Vineyards and groves (citrus, peach, fig) mostly includes summer houses
3.1.1	Broad-Leaved Forest	Formation composed principally of trees, including shrub and bush understoreys, where broad-leaved species predominate
3.1.2	Coniferous Forest	Afforested areas on southern slopes of the Ahir Mountain, and Pine forests dominating higher altitudes of the hills that confine K.Maraş plain in the South
3.3.1	Beaches, Dunes, and Sand Plains	Dune formation in the immediate vicinity of streams
3.3.2	Bare Rock	Unvegetated or sparsely vegetated areas where great part of the land surface is covered by rocks
3.3.3	Sparsely Vegetated Areas	Includes both human induced and natural landscapes such as olive groves and Macchia shrubland, mostly observed in the N/NW locations of the study area. Low-canopy cover Pine stands resulted from excessive firewood extraction and grazing were also considered in this class
4.1	Inland Wetlands	High-altitude seasonal lakes
5.1.1	Inland Water Bodies	Dam reservoir and streams
-	In-Valley Plants	Humid and densely vegetated stream beds. Plant communities dominated by broadleaved tree species such as Caucasian wingnut (*Pterocarya fraxinifolia*), plane tree (*Platanus orientalis*), Laurel willow (*Salix pentandra*), and, in relatively drier locations, kermes oak (*Quercus coccifera*). Poplar plantations (*Populus nigra*) along the streams were also included in this class
-	High Mountain Steppe	Scattered high-altitude vegetation

In LULC, 7.794,88-ha change was seen between 1986 and 2000 in total. It is seen that, in this period, the most important change was experienced in the high mountain steppe with a 3.434,28-ha decrease (Table 2). According to the transformation matrix, it is seen that this class transformed into sparsely vegetated areas to a large extent (3.387,16 ha) (Table 3). The decline seen in high mountain steppe continues between 2000-2013 period. Furthermore, in this period, the effects of afforestation works, which were started as a small province coppice forest in 1963 and expanded later on, were seen and as a result there was an increase in coniferous forest class around %40. The extensions of the dams that were started to be built in the 1990s, showed an important increase (%1.231,12) in inland water bodies class, and the striking part of this increase (%83,40) was in sparsely vegetated areas.

Between 2000-2013, 8536,64-ha change was occured in total (Table 2). The most important change experienced in this period was the 3.116,92-ha increase in permanent crops class. Especially recently, the pastures on the south slopes of the mountain (particularly 600-1200 m) have been transformed into vineyards/gardens and summer houses have been built in these gardens. Thus, the natural habitats on the some parts of the south slope have been observed as narrow lanes among only cultivated areas.

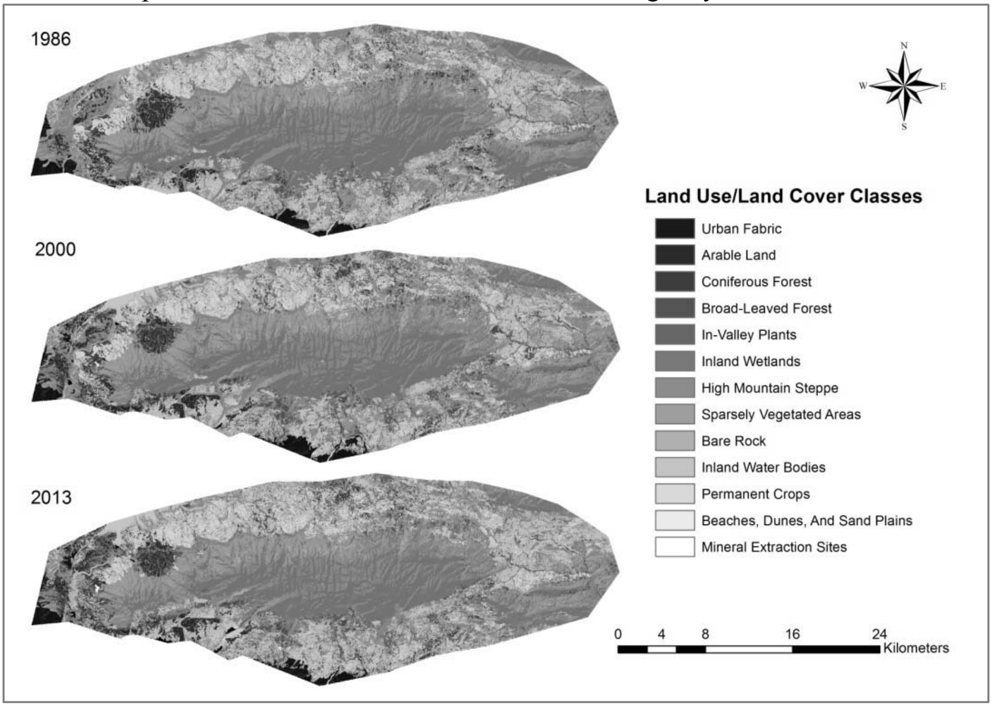

Figure 2. LULC maps of 1986, 2000 and 2013

Table 2. The distribution of LULC classes in 1975, 1990 and 2010

YEARS	**1986**		**2000**		**2013**	
LULC	**ha**	**%**	**ha**	**%**	**ha**	**%**
Urban Fabric	-	-	49,92	0,07	227	0,32
Mineral Extraction Sites	-	-	8,4	0,01	24,48	0,03
Arable Land	1.063,28	1,48	1.275,88	1,77	1.101,52	1,53
Permanent Crops	16.669,36	23,18	16.965,68	23,59	20.082,6	27,92
Broad-Leaved Forest	1.710,4	2,38	2.198,96	3,06	2.347,16	3,26
Coniferous Forest	3.109,56	4,32	4.326,48	6,02	4.633,08	6,44
Beaches, Dunes, and Sand Plains	30,36	0,04	27,24	0,04	14,12	0,02
Bare Rock	3.035,8	4,22	2.575,76	3,58	1.922,04	2,67
Sparsely Vegetated Areas	25.119,8	34,93	25.905,72	36,02	23.182,84	32,24
Inland Wetlands	23,56	0,03	26	0,04	22,64	0,03
Inland Water Bodies	56,68	0,08	754,48	1,05	970,72	1,35
In-Valley Plants	2.649,08	3,68	2.787,64	3,88	3.074,84	4,28
High Mountain Steppe	18.449,8	25,65	15.015,52	20,88	14.314,64	19,90
Total	71.917,68	100	71.917,68	100	71.917,68	100

Table 3. LULCchange matrix, 1986 - 2000

		LULC 1986 (ha)											
		2	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**Toplam (2000)**
LULC 2000 (ha)	**1**	11,32	2,96	0	0	0	0	25,72	5,2	1,6	3,12	0	**49,92**
	2	819,84	3,6	5,56	18,12	0	0	270,08	21,12	0	133,88	3,68	**1275,88**
	3	1,28	1774,72	1,72	9,56	0	10,44	2496,84	10,96	0	20,96	0	**4326,48**
	4	3,92	59,12	1682,36	0	0	306,52	0	147,04	0	0	0	**2198,96**
	5	15,6	119,64	3,6	2370,72	0	24,48	15,16	161	0	77,44	0	**2787,64**
	6	0	0	0	0	22,24	3,24	0,52	0	0	0	0	**26**
	7	0	21,84	7,76	3,24	1,2	14658	279,92	6,48	0	37,08	0	**15015,52**
	8	205,4	1048,64	9	209,24	0,12	3387,16	21033,92	0	12,12	0	0,12	**25905,72**
	9	0	0	0	0	0	0	0	2575,76	0	0	0	**2575,76**
	10	3,4	11,2	0	0,08	0	2,72	582	34,8	42,96	66	11,32	**754,48**
	11	0	66,32	0,32	37,88	0	57,24	406,76	68,28	0	16328,88	0	**16965,68**
	12	2,52	0	0,08	0,2	0	0	2,64	5	0	1,56	15,24	**27,24**
	13	0	1,52	0	0,04	0	0	6,24	0,16	0	0,44	0	**8,4**
	TOTAL (1986)	**1063,28**	**3109,56**	**1710,4**	**2649,08**	**23,56**	**18449,8**	**25119,8**	**3035,8**	**56,68**	**16669,36**	**30,36**	**0**
	Class Changes	**243,44**	**1334,84**	**28,04**	**278,36**	**1,32**	**3791,8**	**4085,88**	**460,04**	**13,72**	**340,48**	**15,12**	**0**
	Img.Difference	**212,6**	**1216,92**	**488,56**	**138,56**	**2,44**	**-3434,28**	**785,92**	**-460,04**	**697,8**	**296,32**	**-3,12**	**0**

1. Urban Fabric, 2. Arable Land, 3. Coniferous Forest, 4. Broad-Leaved Forest, 5. In-Valley Plants, 6. Inland Wetlands, 7. High Mountain Steppe, 8. Sparsely Vegetated Areas, 9. Bare Rock, 10. Inland Water Bodies, 11. Permanent Crops, 12. Beaches, Dunes, and Sand Plains, 13. Mineral Extraction Sites

Table 4. LULCchange matrix, 2000 – 2013

		LULC 2000 (ha)													
		1	2	3	4	5	6	7	8	9	1 0	11	12	13	Toplam (2013)
LULC 2013 (ha)	1	49,92	11,53	0,08	0	0	0	0	121,46	6,3	1,12	36,24	0,31	0,04	227
	2	0	961,09	0,24	0	0	0	0	131,36	3,62	0	0	5,21	0	1101,52
	3	0	5,16	4238,44	0	0,32	0	0,08	351,04	2,24	0,52	35,28	0	0	4633,08
	4	0	14,64	7,88	2198,96	3,84	0	79,68	41,52	0	0	0,48	0,16	0	2347,16
	5	0	42,24	17,6	0	2689,64	0	37,76	229,52	19,12	0,08	38,32	0,4	0,16	3074,84
	6	0	0	0	0	0	22,36	0	0,28	0	0	0	0	0	22,64
	7	0	0	0	0	0	3,64	14290,96	18,76	0	1,28	0	0	0	14314,64
	8	0	68,43	52,96	0	10,44	0	440,8	21333,28	812,84	23,56	433,64	6,61	0,28	23182,84
	9	0	0,2	0,2	0	1,28	0	24,76	305,16	1576,16	0	14,28	0	0	1922,04
	10	0	4,15	0	0	0	0	0	221,98	2,92	727,68	13,76	0,23	0	970,72
	11	0	166,96	9,08	0	82,12	0	141,48	3134,04	152,04	0,24	16393,68	1,84	1,12	20082,6
	12	0	1,48	0	0	0	0	0	0,12	0,04	0	0	12,48	0	14,12
	13	0	0	0	0	0	0	0	17,2	0,48	0	0	0	6,8	24,48
	TOTAL (2000)	49,92	1275,88	4326,48	2198,96	2787,64	26	15015,52	25905,72	2575,76	754,48	16965,68	27,24	8,4	0
	Class Changes	12,16	316,6	88,04	0	98	3,64	724,56	4572,44	999,6	26,8	572	14,76	1,6	0
	Img. Difference	177,08	-174,36	306,6	148,2	287,2	-3,36	-700,88	-2722,88	-653,72	216,24	3116,92	-13,12	16,08	0

1. Urban Fabric, 2. Arable Land, 3. Coniferous Forest, 4. Broad-Leaved Forest, 5. In-Valley Plants, 6. Inland Wetlands, 7. High Mountain Steppe, 8. Sparsely Vegetated Areas, 9. Bare Rock, 10. Inland Water Bodies, 11. Permanent Crops, 12. Beaches, Dunes, and Sand Plains, 13. Mineral Extraction Sites

In relation to the afforestation works that were maintained in the study area, the increase in coniferous forests and broad leaf forests continued in this period. Also, because the water packness in dams increased over years, the area of the inland water bodies class enlarged and accordingly, a striking increase (%10) has been observed in the In-valley plants that exists at waterfronts. A great part of this increase (229,52 ha) occurred on sparsely vegetated areas (Table 4).

DISCUSSION and CONCLUSION

This study was conducted in order to detect spatial and temporal changes of LULC for a period of 27 years (1986–2013) in the Ahir Mountain. A time series of Spot 1, Spot 4 and Rapid Eye images respectively belong to 1986, 2000 and 2013 were used. The images were classified using supervised classification, and a post-classification comparison approach was used in change detection.

The most salient change in 27 years was determined in high mountain steppes. 4152 ha of high mountain steppes were converted other LULC classes. Study area, especially above 1300 m are exposed to pasturage pressure because of the animals of the nomads who settle on the mountain between May and October. That is why the plants on which the animals graze in the study area are observed to decrease gradually. It is stated that endemic *Ankyropetalumreuteri* encounter the danger of extinction on the Mountain which is an Important Plant Area. *Ajugarelicta* has not been seen since 1907 when it was first gathered. It is anticipated that *A. relicta* is extinct because there is no humid habitat around 1830 m where it was gathered and also because of heavy pasturage. Furthermore, *Astragalusakmanii* and *Polygonumekimianum* are under serious danger due to heavy pasturage pressure on the Mountain (Anonymous, 2007). On the other hand, apart from the annual plants that blossom in spring months and give seeds, plants which are not preferred by animals because of the plants' being thorny (*Gundeliatournefortii*) and poisonous (*Helleborusvesicarius*)are commonly present before the nomads arrive.

Also, activities such as the establishment of orchards and arable farming cause pressures on the natural structure of the Mountain. The close location of the Mountain to the city of Kahramanmaraş causes gradual increase in recreational uses in the orchards at the south slopes and summer house construction activities. Furthermore, because of the afforestation works that was started in the 1960s, coniferous forest class has expanded almost %50. Yet, as a result of the growing trees that shade the lower flora, it is stated that plant diversity has decreased and forage vegetation types fall into ruin (Doygun, Kısakürek, Erdoğan, & Hatipoğlu, 2014).

The obtained results present that Ahir Mountain is under the pressureof human activities. It is grasped that firstly the topographical structure, then vegetation and visual integrity have been destroyed significantly. Also, there is no systematic planning and preservation work that will eradicate these threats and manage the area with rational use principles (Doygun, Kısakürek, Erdoğan, & Hatipoğlu, 2014).

To minimize effectively the negative impacts of LULC change to the environment, to develop systematic planning and preservation strategies there is a need for accurate, reliable and up to date data at regular intervals. Remote sensing technology and change detection techniques can serve as a basic data source for this need.

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Chapter 42

Landscape Preferences of the Elderly

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1. INTRODUCTION

The main target of landscape architecture is to be able to respond to physiological, psychological, aesthetic needs and tastes of people. According to the science of psychology that tries to find the reasons underlying human behaviours, needs and tastes vary from person to person, and from society to society (Gıbb, 2001). Thus, the science of psychology is quite important for landscape engineering just as all other professional disciplines that directly serve people. One's emotions, age, gender, fears, concerns, profession, etc. affect his/her psychology, and the landscape preferences and assessments made in line with his/her needs and tastes are also affected (Ulrich 1983, Kaplan&Kaplan 1989, Ronnberg 1998).

In line with this information, the sample group in this study was chosen among the elderly starting from the presumption that the liking and preferences of people in different age groups for their environment are different. The population structure of Turkey was investigated while choosing the experiment group, and it was observed that the percentage of the elderly population within total population gradually increases. In our country, where the number and percentage of the elderly increase, it was found that any kind of study and research about the elderly should be increased. In addition to this, another reason for choosing the elderly as the sample group is that the needs of the elderly are generally not taken into consideration or sufficiently fulfilled (Hough & Barrett, 1987; Fog & Fulton, 1994; Estepa, 1999).

Changes are observed in the needs of the elderly together with the aging process. These changes that occur in their physiological and psychological needs also affect their spatial expectations (Lyons 1983, Zube et.al., 1983, Bosselmann1987). Furthermore, the features of the age (young old, middle old, very old), gender, marital status, life standard, geographical place (city, country) also affect the needs (Lyons 1983, Zube et.al., 1983, Ory et.al., 1992, Foot&Stofman 1996).

1.1. Objective of the Study

The objective of this study is to analyse and assess different urban open and green spaces and the landscape elements there and their way of coming together depending on mental (perceptional and cognitive) processes. Depending on these processes, the final behaviour; i. e. what the landscape preference is and its reasons will be investigated.

Another objective of this study is to examine the interaction of the elderly with their environment and to determine what the elderly find important while making their preferences by benefiting from the features and qualifications of their environment. What the space design criteria for the elderly should be for the elderly will be also

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examined without confining to analysing the mental processes of the elderly.

1.2. The elderly and their environment

While trying to understand the environment-human relations, personal features and environmental features could not be isolated from one another. The reason for this is that a human is in a constant mutual relationship with the environment. If we define a human being as two systems; he is an open system with his features, activities, needs and behaviours; and a closed system with his perception and cognitive processes. A human being faces this closed and open system with the environment. Consequently, human perception is affected by need impulses, the cognition is formed and reacts to the environment in the form of either "to prefer and not to prefer" with the behaviours (Özbilen, 1991).

After investigating the relationship between humans and the environment in general, if we go down to the private about the elderly and their environment; according to Gubrium (1973), the interaction between the environment and the individual affects the aging process (Hooyman & Kiyak, 2005). The changes in the environment variables in this interaction affect the process of aging.

According to the social-environmental theory that tries to explain the relationship between the elderly and their environment, the activity capacity of the elderly is a source that determines their potential as individuals. The more the elderly perform their activities the higher their spirit will be. What the environment means for the socio-environmental theory is about in which social situation the elderly are active. The potential activity expectations of the elderly change from one situation to the other. In heterogeneous environments (which include people of all ages), the social content of the elderly will be higher compared to homogeneous environments (which include people of only the same age). In cases in which the activity sources are the same, the elderly will be in higher spirits if there is a heterogeneous age distribution. The elderly feel better (Gubrium, 1973).

According to the activity theory, the ability of an individual to maintain his positive self-perception depends on his ability to replace the roles and status he had to lose as a result of aging with new roles. The fulfilment of the elderly of their need to have new roles depends on the appropriate environmental conditions (for example; low sidewalks, properly sloping roads, non-slippery floors, etc.) (Durak, 2004).

1.3. Mental processes of the elderly

Mental processes start with perceiving. Perception is to see, hear and feel any object, incident, and relationship. In short, it is the process of obtaining information from the outer world with our five senses. The perception process, which is the instant assessment, may change by being affected by the knowledge, memory and mental processes, level of awareness, subconscious, attention and aims. If each of these features is accepted as a filter, these may change from person to person and society to society (Cüceloğlu, 2010), i.e. there may be perception differences between the elderly and non-elderly.

The emotions that sensory organs transmit to the brain are simple; while perception is an extremely complex process that includes our past learning and experiences.

We can gather the variables affecting perceptional choice in two groups;

Table 1. Variables affecting the perception (Cüceloğlu, 2010)

GROUP 1, PROPERTIES OF THE STIMULI	GROUP 2, PROPERTIES OF THE PERCEIVING INDIVIDUAL
PROPERTIES OF THE ENVIRONMENT ✓ Animate and inanimate elements (landscape elements) ✓ Properties of landscape elements (measure, shape, colour, texture, etc.)	PROPERTIES OF THE ELDERLY ✓ Socio-Demographic properties ✓ Need ✓ Taste ✓ Expectation

The assessment of and satisfaction with an environment will be successful with these sensory, emotional and mental relation processes. The visible surfaces of the environment are defined as "shape" in visual perception and human emotions and thoughts. While a person contacts the environment that he/she perceives, understands and interprets it through the "shape", the meaning it bears either reaches or fails to reach the sense of appreciation through the visual attribute (Şentürer, 1995).

An individual takes pleasure from his/her environment by striking an aesthetic attitude in the process of environmental assessment that we can define as behaving and making certain decisions by making certain choices as a result of perceiving environmental qualities. Rapoport (1977) that expresses that the perceived environment is assessed with norms, ideas and standards also defends that these may change.

1.4. Needs and tastes of the elderly

As human beings, we are already born with many needs. One of these needs is to be dependent and the another one is to be independent. These two needs are two opposite poles (Cüceloğlu, 2001). After the age of seventy, people have certain needs that they want to be fulfilled. We can address these needs under the following titles: 1. Being respected, being able to control oneself, 2. Participating in activities that one likes and is pleased with, 3. Being an individual that contributes to the society, 4. Maintaining contact with young people, 5. Maintaining a physically and mentally healthy life. People always need to conversate with others. This need gradually increases in old ages.

A well-arranged open green area increases the social activities of the elderly, positively affects their psychological state, and helps them live in serenity and peace (Özkan,1997). The topography slope should be in such a way that it minimizes the ramps and stairs. Flat spaces are quite important for the walking of the elderly. Care should be taken that elderly-specific spaces are easily-accessible places. Their contact with the environment should be ensured. Recreational and sports spaces should be away from the noise and air pollution. Plants with the living structure of open and green spaces should be correctly included. Any kind of comfort conditions should be provided.

2. MATERIALS AND METHOD

2.1. Study area

Trabzon city that is located in the Eastern Black Sea Region of Turkey was chosen as the research area (40° 33' N- 41° 07' N, 37° 07' E- 40° 30' E). The third biggest city of the region, Trabzon's population is over 250.000 and its surface area is 190 m^2. Its elevation from the sea is 37 m, the annual amount of precipitation is 760 mm on average, and its average temperature is 14,6°C.

2.2. Data collection and evaluation of the photographs

The study was carried out in two phases. At the first stage, 9 photographs representing urban open and green spaces (figure1) were assessed with a group of 103 elderly. The surveys were carried out face-to-face and one-to-one. Nine different open and green spaces were determined in the city centre of Trabzon. These are; (1) Boztepe Picnic Area, (2) Kanuni House Open Green Area, (3) Zağnos Valley Recreational Area, (4) Atapark Park, (5) Hagia Sophia Museum Open Green Area, (6) Lovers Park, (7) Square Park, (8) Ganita Park, and (9) Turkish-Japanese Friendship Park (figure 1). The photographs of these spaces were numbered from 1 to 9 in the survey. The elderly were asked to sort these photographs given in the numbered form in the survey (figure 1) from the ones they prefer most to the ones they prefer least. Two open and green spaces preferred most and least by each person were determined at this stage.

At the second stage, the photographs of four open and green spaces were given to the elderly according to the results found at the previous stage, and the landscape elements and properties of the open and green spaces that are most and least preferred

Figure 1. Open and green spaces in the centre of Trabzon city in the survey

by the users and the coming together of these elements were assessed by the mental processes of the elderly.To this end, the semantic differential technique was used. The semantic differential scale was used in order to measure visual values (Osgood, 1975). The semantic differential technique can be used in order to reveal urban open and green spaces, the landscape elements in these spaces and the perception of the design principles in the coming together of these elements using semantic properties (Acar et al., 2003). 11 opposite adjective pairs were chosen in order to assess the photographs according to this technique. Among these, the adjective pairs of boring-interesting, ordinary-original, not affected-affected, attractive-repulsive, ugly-beautiful, artificial-natural, monotonous-moving, exhausting-relaxing, disorganized-organized, complex-simple, neglected-well-kept were used in the assessment of the open and green spaces of the subjects by their mental processes. The users were asked to make an assessment for the photographs shown by giving the scores -2, -1, 0, 1 and 2 for each adjective pair on the survey form. The answers were turned into the digits 1, 2, 3, 4 and 5 in order for the assessment to be easier in the transfer of the surveys to the computer.

2. RESULTS

The landscape preferences of the elderly were determined according to the results obtained in this study. The photographs of 9 open and green spaces selected in Trabzon city centre (figure 1) were questioned from 103 elderly users using the face-to-face survey method. The photographs of open and green spaces numbered from 1 to 9 (figure 1) were shown, and the users were asked to make a ranking from the place they visit most to the least and indicate the reasons.

Accordingly, as per the results of the survey conducted with 103 elderly users in total at the age of above 55, they expressed that they mostly prefer the Square Park, and Atapark Park at the second place. When the least preferred places are examined, the elderly mostly wrote Kanuni House Open Green Area at the eighth place, and Hagia Sophia Open green area at the ninth, i.e. last place (Table 2).

Consequently, the finding obtained at this stage is that the elderly prefer most the Square Park among the open and green spaces in Trabzon city centre, which is followed by Atapark Park. They prefer Kanuni House Open Green Area and Hagia Sophia Open Green Area the least (Table 2). They wrote being mostly readily accessible, in a central position, near mosques, safe and giving the opportunity to chat with friends as their reasons of preference.

They indicated such reasons as being hard to reach, having a little place of activity and being expensive in regard to the places they prefer the least. At this stage, the semantic differential technique was used in order for four open and green spaces to be assessed by the elderly at the second stage. Separate semantic differential scales were given in the form of the survey for Square Park, Atapark Park, Kanuni House Open Green Area and Hagia Sophia Open Green Area, and 11 opposite adjective pairs (boring-interesting, ordinary-original, not affected-affected, attractive-repulsive, ugly-beautiful, artificial-natural, monotonous-moving, exhausting-relaxing, disorganized-organized, complex-simple, neglected-well-kept) were chosen for the assessment of the photographs. The arithmetic mean of the responses from 1 to 5 for the adjective pairs for each open and green space, and graphs were created accordingly (Figure 2).

Table 2. Open and green spaces ranked at the first, second, eighth and ninth place by the elderly and their rates

Open and green spaces ranked at the first place by the elderly and their rates

1.BOZTEPE PİCNİC AREA		2.KANUNI HOUSE OPEN		3.ZAGNOS VALLEY REC.A.		4.ATAPARK PARK		5.HAGIA SOPHIA OPEN GREEN		6.LOVERS PARK		7.SQUARE PARK		8.GANITA PARK		9.EYOF PARK	
N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
9	8,7	-	-	5	4,8	27	26	-	-	9	8,7	50	48,1	3	2,9	-	-

Open and green spaces ranked at the second place by the elderly and their rates

1.BOZTEPE PİCNİC AREA		2.KANUNI HOUSE OPEN		3.ZAGNOS VALLEY REC.A.		4.ATAPARK PARK		5.HAGIA SOPHIA OPEN GREEN AREA		6.LOVERS PARK		7.SQUARE PARK		8.GANITA PARK		9.EYOF PARK	
N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
11	10,6	-	-	3	2,9	49	47,1	-	-	11	10,7	16	15,4	13	12,5	-	-

Open and green spaces ranked at the eighth place by the elderly and their rates

1.BOZTEPE PİCNİC AREA		2.KANUNI HOUSE OPEN GREEN AREA		3.ZAGNOS VALLEY REC.A.		4.ATAPARK PARK		5.HAGIA SOPHIA OPEN GREEN AREA		6.LOVERS PARK		7.SQUARE PARK		8.GANITA PARK		9.EYOF PARK	
N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
2	1,9	41	39,4	8	7,7	2	1,9	15	14,4	2	1,9	2	1,9	5	4,8	26	25

Open and green spaces ranked at the ninth place by the elderly and their rates

1.BOZTEPE PİCNİC AREA		2.KANUNI HOUSE OPEN GREEN AREA		3.ZAGNOS VALLEY REC.A.		4.ATAPARK PARK		5.HAGIA SOPHIA OPEN GREEN AREA		6.LOVERS PARK		7.SQUARE PARK		8.GANITA PARK		9.EYOF PARK	
N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
-	-	26	25	4	3,8	-	-	30	28,8	8	7,7	-	-	8	7,7	27	26

Considering all of the data, it was seen that the adjective pair scoring of the photographs of Square Park, Kanuni House Open Green Area and Hagia Sophia Open Green Area varies. When the scoring of the boring and interesting adjective pair was examined, it was seen that Square Park has a score of 3,43, Atapark Park has 3,22, Kanuni House Open Green Area has 2,56 and Hagia Sophia Open Green Area has 2,73. When the scoring of the ordinary and original adjective pair was examined, it was seen that Square Park has a score of 4,01, Atapark Park has 3,81, Kanuni House Open Green Area has 3,06 and Hagia Sophia Open Green Area has 2,77. According to the scoring of the not affected and affected adjective pair, it was seen that Square Park has a score of 3,85, Atapark Park has 3,69, Kanuni House Open Green Area has 3,11 and Hagia Sophia Open Green Area has 2,59. When it comes to the scoring of the adjective pair of repulsive and attractive, it was seen that Square Park has a score of 3,72, Atapark Park has 3,47, Kanuni House Open Green Area has 2,46 and Hagia Sophia Open Green Area has 2,96. According to the scoring of the adjective pair of artificial and natural, it was seen that Square Park has a score of 3,63, Atapark Park has 3,37, Kanuni House Open Green Area has 2,56 and Hagia Sophia Open Green Area has 2,63.

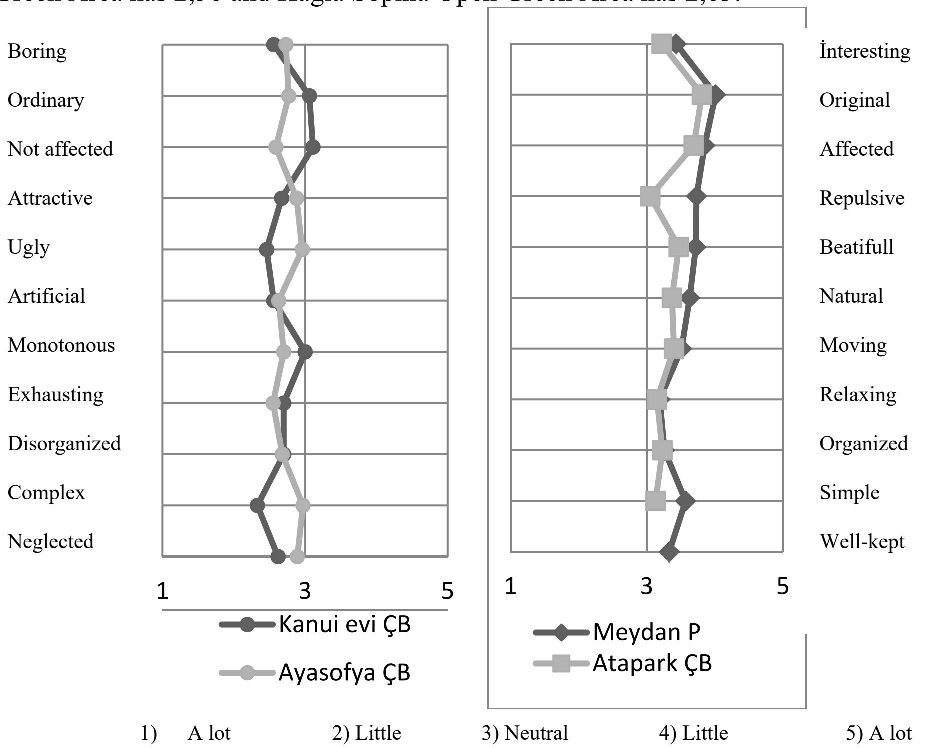

Figure 2. Semantic differential assessment of the most and least preferred open and green spaces.

According to the scoring of the adjective pair of monotonous and moving, it was seen that Square Park has a score of 3,51, Atapark Park has 3,40, Kanuni House Open Green Area has 3 and Hagia Sophia Open Green Area has 2,70. According to the scoring of the adjective pair of exhausting and relaxing, it was seen that Square Park has a score of 3,19, Atapark Park has 3,15, Kanuni House Open Green Area has 2,7 and Hagia Sophia Open Green Area has 2,55. According to the scoring of the adjective pair of disorganized-organized, it was seen that Square Park has a score of 3,26, Atapark has 3,23, Kanuni House Open Green Area has 2,7 and Hagia Sophia Open Green Area has 2,68. According to the scoring of the adjective pair of complex and simple, it was seen that Square Park has a score of 3,57, Atapark Park has 3,13, Kanuni House Open Green Area 2,33 and Hagia Sophia Open Green Area has 2,97. Lastly, according to the scoring of the adjective pair of well-kept and neglected, it was seen that Square Park has a score of 3,33, Atapark Park has 3,11, Kanuni House Open Green Area has 2,62 and Hagia Sophia Open Green Area has 2,89 (Table 3).

The results at the first and second stage are in parallel, i.e. the Square Park was determined as the open and green space that is preferred by the elderly at the most. It was seen that the photographs of this place had the highest values in the scoring of the adjective pair as a result of the second stage (Table 1, Table 2). Similarly, the semantic differential results for Atapark Park that is ranked as the second were found lower than the scoring of Square Park (Table 2). Kanuni House Open Green Area was found as the eighth in the preference ranking of the elderly. Hagia Sophia Open Green Area was found at the last place, i. e. at the ninth place (Table 3). As a result of the scoring of the differential scores of these two least preferred areas, it was found that while Hagia Sophia is at the ninth place in certain adjective pairs, it had higher scores than Kanuni House Open Green Area (Table 3). Hagia Sophia Open Green Area had higher scores than Kanuni House Open Green Area in the adjective pairs of boring-interesting, repulsive-attractive, ugly-beautiful, artificial-natural, complex-simple, neglected-well-maintained.

Table 3. Semantic differential scoring of open and green spaces assessed by the elderly

	Square P	**Atapark P**	**Kanuni House OGA**	**Hagia Sophia OGA**	
Boring	3,43	3,22	2,56	2,73	**Interesting**
Ordinary	4,01	3,81	3,06	2,77	**Original**
Not affected	3,85	3,69	3,11	2,59	**Affected**
Repulsive	3,73	3,05	2,67	2,88	**Attractive**
Ugly	3,72	3,47	2,46	2,96	**Beautiful**
Artificial	3,63	3,37	2,56	2,63	**Natural**
Monotonous	3,51	3,40	3	2,70	**Moving**
Exhausting	3,19	3,15	2,7	2,55	**Relaxing**
Disorganized	3,26	3,23	2,7	2,68	**Organized**
Complex	3,57	3,13	2,33	2,97	**Simple**
Neglected	3,33	3,11	2,62	2,89	**Well-kept**

3. DISCUSSION AND CONCLUSIONS

In this study that examines the landscape preferences of the elderly depending on their mental processes, understanding urban open and green spaces, the landscape elements there, their properties and the design principles in the coming together of these elements with semantic properties were assessed according to the mental properties of the elderly. This study was performed in the open and green spaces in the city centre of Trabzon. The striking result of the study is that the findings obtained as a result of the first and second stages seem to support each other. In other words, the average scores taken by the elderly from the semantic differential scale in terms of the properties, landscape elements and design of two open and green spaces that they prefer most are at quite a positive level. When the scores of the spaces they prefer least were examined, it was determined that the average scores are at a low level when compared to the two spaces they prefer the least.

Each environment has components (animate and inanimate elements) that define it. The environment is the product of the coming together of the shape, tissue and colour properties of these components. In this context, the definition of the components of the environment (plants, seating units, covers, terraces, verandas, roads, paths, ramps, stairs, etc.) and their patterns of coming together are quite important in the perception, assessment and finally preference of the environment (Dede, 1997; Şentürer, 1997;

Kalın, 1997). Animate and inanimate, all environment components and the way they come together were effective in the perception, assessment and the preference of the most and least preferred open and green spaces in this study. The needs and tastes of the elderly have also been quite important factors in their preferences. Chan &Lee (2006) also found that friends constitute a major part of the social relationships of the elderly, and similar results were found in this study. The elderly stated that among the reasons for their preference of the square park among the open and green spaces is that most of their friends prefer it and they can meet with them there. Furthermore, friendship relations are regarded important for an active aging process (Fiori et al., 2006).

Recent studies show the importance of the accessibility, safety, dominance, direction, privacy and socialization of closed or open elderly spaces (Cartens 1985; Howell 1980; Lawton, 1990). In this study carried in the open and green spaces in the city centre of Trabzon, the elderly expressed that they prefer the areas they prefer as they are easily accessible, safe and provide the opportunity to socialize, and they think otherwise for the open and green spaces at the last place in the preference ranking.

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Chapter 43

Recreational Requirements of Adolescents on Parks in Ankara, Turkey

Rukiye Duygu ÇAY*, Dicle OĞUZ**

1. INTRODUCTION

Today, rapid population growth, distorted urbanization and concretization become salient together with industrialization. As a result, people increasingly long for nature and green spaces. Parks are the areas that satisfy such longing and meet recreational needs in cities.

Parks provide opportunities for physical activity, social interaction and retreat in a natural environment (Hayward & Weitzer, 1984). Services offered in parks also provide individuals with various social, economic and environmental benefits.

Studies conducted on use of urban parks report that majority of park users like to access parks by walking, and that, if parks are within 3-5-minute walking distance from their home or office, they regularly visit parks (Godbey, 1992; Kaplan & Kaplan, 1989). Individuals who have difficulty going out of their local boundaries due to factors such as age, economic status, accessibility etc. are those who need to use urban parks and socialize in outdoor locations the most (Ward Thompson, 2002). Therefore, using green areas located within neighborhood boundaries come into prominence.

Erkip (1997) stated that park utilization is correlated with distance that the farthest park has the lowest utilization. Aksoy and Akpınar (2011) revealed that users' preference of parks is based on their proximity, and that they mostly walk to the parks.

Income level of users directly affects their preference of recreational activities. An increased income increases participation in activities spending money, as well as leads to preference of more passive recreational activities (Müderrisoğlu, 2002). Oğuz (2000) stated that medium and low-income individuals do not have many alternatives for leisure activities and recreational needs and therefore, the most convenient and economical recreational way for them to interact with nature and spend their leisure is to visit parks.

The main aim to use parks is to satisfy recreational needs by interacting with nature (Oğuz, 2000). Urban natural areas provides individuals with emotional, cognitive, developmental, behavioral and social benefits. Accordingly, natural areas reduce stress, enhance happiness, reduce mental fatigue, induce mental activities, support self-confidence, and has a positive impact on social communication by removing social class barriers (Özgüner, 2004).

Teenagers find opportunity to socialize while doing physical activities in parks

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such as walking, exercising and playing. Besides socializing, young people at this age group need to be isolated and individuate themselves, too. Therefore, they intensely need open areas to satisfy their such needs.

Young people's access to safe parks proximate their home in urban areas supports physical activity (Stockdale & Barker, 2009). Ward Thompson (2013) stated that design and management of public spaces is associated with encouraging physical activity. Creating attractive streets, parks and outdoor spaces provide to increase physical activity level.

Personal development in adolescence involves two main processes: socializing (development of relationships with other people and starting to be a part of the social world) and individualization (developing a sense of independence with separate from other people) (Rıce & Dolgin, 2005). Malone and Hasluck (1998) stated that teenagers use their immediate environment to socialize outside their families and develop their individual identity.

Teenagers spend a great deal of their time in activities such as socializing and thinking (Fischman, 1987). The experiences of teens during these activities affect the personal development of adolescents. Spending time with their friends enables teens to become independent from their parents, an important step to becoming adults (Larson & Richards, 1989). Adolescents social interaction with friends and with adults to become socially mature (Owens, 1997).

Lloyd, Burden, and Kiewa (2008) stated that teenagers have opportunities to retreat from adults with peers or meet the adult world in spaces that allow social interaction. Public spaces are areas where teenagers' developing sense of self-identity in tested out in relation to peers and other members of society (Travlou, 2003; Ward Thompson et al., 2004). Young people spend a large amount of free time in public spaces with more autonomy and freedom from parental supervision (Travlou, 2007).

Teenagers' complex personal geographies are affected by interaction with adults and relations between themselves (Tucker, 2003). It is important to provide places for social integration and interaction, safety and free movement, accessibility, and variety of activities for adolescents (Travlou, 2007).

On the other hand, despite the importance of social interaction, adolescents also need spaces for retreat (Lieberg, 1997). The mean of retreat is avoiding parents, other teenagers, or peers. Having places to retreat and be alone can help teenagers to think about feelings and maintain a coherent level of self-concept and self-esteem (Korpela & Hartig, 1996).

Outdoor areas preferred by young people are the places where they can interact with the nature, interrelate with their friends, become isolated when they wish to do so, see without being seen, accessible and define as their own (Owens, 1994). Studies shown that access nearby parks and nature settings is associate with improved mental health (Payne, Orsega-Smith, Roy, & Godbey, 2005; Sugiyama, Leslie, Giles-Corti, & Owen, 2008) and physical health (Payne et al., 2005).

This study aims to determine teenagers' ways of spending their leisure time and their park utilization patterns, and investigate their recreational needs. It also aims to determine effects of demographic and socio-economic differences on their recreational preferences. Although there are several studies on recreational behavior and park use of children and adults, studies especially focusing on teenagers are scarce. The current study also aims to fill this gap in the literature.

2. MATERIAL AND METHOD

2.1. Study area

The study was conducted across the sub-provinces of Altındağ, Çankaya, Keçiören, Mamak and Yenimahalle in Ankara. Akpınar and Ulus (2005) indicated that these sub-provinces has different income levels and socio-economic structures from one another, and ranked them from the highest income level to lowest income level respectively as Çankaya, Altındağ, Yenimahalle, Keçiören and Mamak (Figure 1).

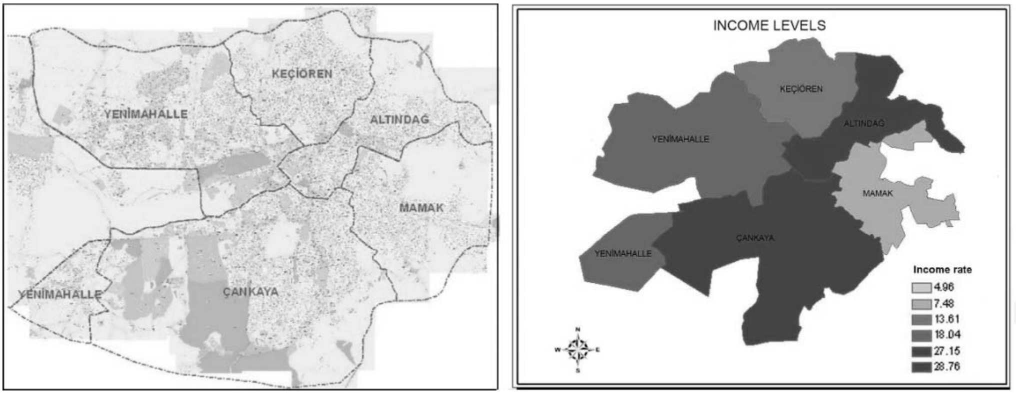

Figure 1. The location of the sub-provinces and income levels in the study area

Samples were selected from these locations to investigate the impact of social and economic differences on recreational preferences as well (Table 1). The questionnaire was conducted at Aydınlıkevler Vocational High School, Keçiören Industrial Vocational High School, Ayrancı High School, Deneme High School and Ankara University Development Foundation School (Figure 2).

Table 1. Parks that are located near schools in the study area

School	Distance from park to school (m)	Number of parks	Total Size (m^2)
Ayrancı High School	0 – 400 401 – 800	1 4	1.855 282.323
Deneme High School	0 – 400 401 – 800	2 3	15.975 43.910
Aydınlıkevler Vocational High School	0 – 400 401 – 800	2 5	4.827 686.387
Keçiören Industrial Vocational High School	0 – 400 401 – 800	3 7	10.516 59.991

2.2. Data collection

The current study that aims to determine recreational needs of teenagers used questionnaire, observation and interview tools. The questionnaire was aimed to investigate teenagers' demographic details, ways of spending leisure time, and existing park visiting habits, and satisfaction levels with and expectations from parks. The questionnaire study was conducted in October during the 2010-2011 Spring Term.

According to the data by the National Education Directorate of the Ankara Province, the population is 140,000. Accordingly, the number of survey samples were determined as 330 students, taking into consideration a confidence level of 95% and a deviation of (α=0,05) +5.3%. However, after cancelling the invalid forms, the total number went down to 225. In addition to selection of different neighborhoods as study areas because the results would vary also by income level, questionnaire was conducted at vocational high schools that usually low-income students attended, public high schools where middle-income students attended, and a private high school where high-income students attended. Based on the age parameter, questionnaire was administered on the teenagers between ages of 14 and 17 to reflect variations of park visiting habits and expectations from parks.

In order to identify basis for young people preference of frequenting specific parks, physical characteristics of the parks proximate the schools questionnaire was administered, and their distance to these schools were investigated. These parks were observed between 10:00-13:00 and 15:00-19:00 hours in fall and spring on different days including week days and weekends.

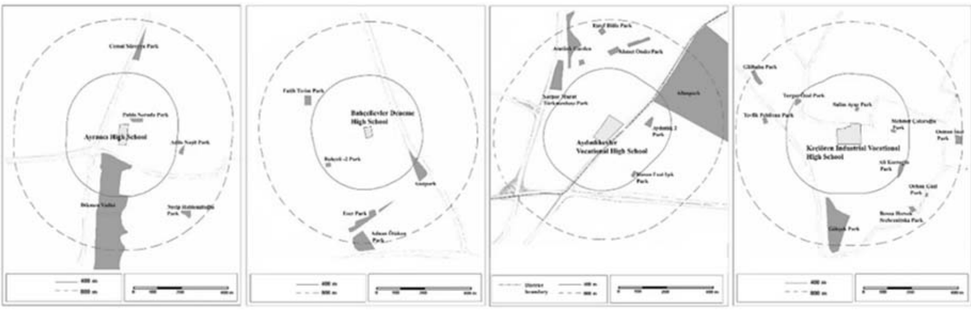

Figure 2. Parks that are located near schools in the study area

2.3. Statistical analysis

The data obtained from the questionnaire were transferred to and analyzed on computer using the SPSS program. 3-point and 5-point Likert type scales were used in the questionnaire. At the analysis stage, chi square independence test, t-test and f-test (ANOVA) were conducted.

The 5-point Likert-type scale was used in the question regarding the teenagers' ways of spending leisure time in parks, and the levels were established as "Never" (1), "Rarely" (2), "Sometimes" (3), "Often" (4), and "Very Often" (5). Levels of agreement values were identified for each statement. The arithmetic means were calculated according to the total value calculated by multiplying the identified values by the option coefficient.

To identify the effect of distance and accessibility of parks on their use, "proximity analysis" was performed. Proximity of the parks to where the teenagers lived was identified with numerical values and ranked as "proximate", "both proximate and distant", and "distant". Their distribution based on age and gender was analyzed with t-test, and based on income level with f-test.

3. RESULTS

The results obtained in this study indicated that teenagers walked to the parks they frequently visit (81.8%). The young people especially preferred parks that they could reach easily and at a short time, without the need of using a vehicle more. A significant portion of the young people could traveled to parks in 5-15 minutes (Table 2).

According to the proximity analysis, teenagers preferred mostly going to the parks proximate their neighborhoods and schools. It was investigated that, while their preference of proximate parks did not change according to gender and income level, the young people at the 17-age group went to the proximate parks as well as those that were distant (Table 3).

Table 2. Duration of access to parks

Duration of access	N	%
5-15 Minutes	157	69,8
16-30 Minutes	43	19,1
> 30 Minutes	25	11,1
Total	**225**	**100**

The most common reason for the young people's preference of their most-frequented parks was their ease of access to these parks. According to the study results, while this finding did not vary across the young people's gender, age and income levels, especially proximity and ease of access of parks were important factors for the younger teenagers and girls in terms of use.

Table 3. Distribution between proximity of parks frequented by the participants and their living premises and gender / age/ income groups

			N	Mean	SD	t	p
Proximity	Gender	Female	82	1,49	0,671	-0,277	0,782
		Male	104	1,52	0,717		
	Age	17	82	1,66	0,764	***3,163***	***0,002****
		14	104	1,35	0,585		
			N	**Mean**	**SD**	**F**	**p**
	Monthly Income Level	< 1000 TL	59	1,63	0, 757	1,395	0,238
		1001-2000 TL	63	1,41	0,650		
		2001-3500 TL	22	1,61	0,698		
		> 3500 TL	23	1,26	0,452		

It was seen that while a large majority of the young people (82.2%) spent their leisure time at home, only 22.2% of them spent their leisure time at parks. Female students among the teenagers spent more time at home than male students and that young people who are 17 years old spent more time in cafes/restaurants. While students from families with monthly income of TL1,000 and below spent more time at home, students with income level of TL 3,500 or above spent more time at shopping centers and cafes/restaurants ($p < 0,05$) (Table 4).

There were several reasons why teenagers did not prefer going to parks. Face-to-face interviews indicated that among these reasons were that young people did not have enough time to go to parks during school term, that they were not satisfied with the proximate parks, that these parks did not satisfy their needs or appeal to them, and that they did not find parks safe. A largest portion of the participations visited parks once a month. This was followed by visitation of everyday/few times a week and once a week. While park visitations of once a month were significantly higher in the girls than in the boys, park visitations of every day or once a week were significantly higher in the boys than in the girls.

Table 4. Distribution of places which participants spend their leisure time according to gender / age groups

		Gender		Age		Monthly Income Level			
		Female	Male	17	14	< 1000 TL	1001- 2000 TL	2001-3500 TL	>3500 TL
At Home	N	93	92	83	102	63	63	19	28
	%	85.3	79.3	83,0	81,6	88,7	85,1	76,0	82,4
		p: 0,239, p>0,05 x^2: 1,389		p: 0, 785, p>0,05 x^2: 0,074			**p: 0,016***, p<0,05 x^2: 12,187		
At Friend's Home	N	48	31	34	45	21	22	12	15
	%	44,0	26,7	34,0	36,0	29,6	29,7	48,0	44,1
		p: 0,007*, p<0,05 x^2: 7,393		p: 0, 755, p>0,05 x^2: 0, 098			p: 0,241, p>0,05 x^2: 5,481		
At Shopping Centers	N	60	36	45	51	19	33	12	21
	%	55,0	31,0	45,0	40,8	26,8	44,6	48,0	61,8
		p:**0,000***, p<0,05 x^2: 13,245		p: 0, 527, p>0,05 x^2: 0, 401			**p: 0,009***, p<0,05 x^2: 13,626		
At Parks	N	19	31	20	30	17	16	7	5
	%	17,4	26,7	20,0	24,0	23,9	21,6	28,0	14,7
		p: 0, 094, p>0,05 x^2: 2,808		p: 0, 473, p>0,05 x^2: 0, 514			p:0,779 , p>0,05 x^2: 1,762		
At Library	N	9	9	7	11	6	6	2	3
	%	8,3	7,8	7,0	8,8	8,5	8,1	8,0	8,8
		p: 0, 890, p>0,05 x^2: 0, 019		p: 0, 245, p>0,05 x^2: 0, 621			p:0,986 , p>0,05 x^2: 0,351		
At Cafes/ Restaurants	N	34	37	45	26	11	22	9	20
	%	31,2	31,9	45,0	20,8	15,5	29,7	36,0	58,8
		p: 0, 910, p>0,05 x^2: 0, 130		p:**0,000***, p<0,05 x^2: 15,064			**p: 0,000***, p<0,05 x^2: 21,771		

Teenagers stated that they visited parks mostly in the afternoon (35.1%). While park visitation in the afternoon was significantly higher in the girls than in the boys, park visitations in the evening was significantly higher in the boys than in the girls.

Visitation of parks in the school vicinity was determined to be more frequent. The young people were seen to prefer areas that are easy to access after school. One of the most important reasons for the young people to visit parks was to spend time and chat with their friends.

Isolation and individuation are a part of their development for teenagers. The current study identified that the young people preferred going to the parks alone as well as with their family members and friends (8.0%).

When the participating young people were asked about their expectations;

- The option selected the most was the safety of parks (75.1%).
- Besides the safety of parks, the expectation of green parks was also among the most selected options (72.0%).
- The expectation of availability of walking tracks in parks was higher in the girls than in the boys.
- The expectation of availability of adequate sitting areas was higher in the young people at 17 age group than those at 14 age group.
- The expectation of green parks was higher in the young people at 17 age group than those at 14 age group.
- The expectation of availability of establishments such as tea house/kiosk in parks was higher in the young people at 17 age group than those at 14 age group.
- The expectation of availability of adequate sitting areas in parks was higher in the young people with income level of TL 1,000 and below, the expectation of availability of establishments such as tea house/kiosk in parks was higher in the young people with income level of TL 2,001-3,500 (Table 5).

The young peopled stated that they spent their time in the parks at frequent intervals by chatting with friends, strolling in the open air, at medium intervals by engaging in individual sports activities and team sports, rarely by sitting at tea houses, reading books/magazines, doing picnic, using computer/game consoles, at no interval by walking dog.

The study resulted that a large majority of the teenagers did not visit parks. The questionnaire and face-to-face interviews established that the reasons for the young people not to visit parks were that the parks were not designed to appeal to the young people, that the parks were not have adequate green and natural spaces, that the parks were not safe, that most parks were poorly maintained, and that there were more appealing locations than parks such as shopping centers.

Altındağ, Çankaya, Keçiören, Mamak and Yenimahalle sub-provinces were explored as sampling space in this study; and according to the observations;

It was identified that there were sufficient number of parks in Keçiören sub-province within 5-15 minute walking distance from schools, and that there were however no sufficient number of parks in Çankaya and Altındağ sub-provinces.
There were usually seating units, children playgrounds and decorative pools in the parks. However, most parks did not have appropriate spaces for young people only to spend time with their peers. The young people stated that they did not feel comfortable with being in the same areas especially together with children and seniors.

Table 5. Distribution of expectations regarding parks according to the gender / age groups

		Gender		Age		Monthly Income Level			
		Female	**Male**	**17**	**14**	**< 1000 TL**	**1001- 2000 TL**	**2001-3500 TL**	**>3500 TL**
Availability of adequate sitting areas	N	74	78	77	75	49	42	22	22
	%	67.9	67.2	77.0	60.0	69,0	56,8	88,0	64,7
		p: 0, 917, p>0,05 x^2: 0, 011		p: **0,007***, p<0,05 x^2: 7,325		p: **0,031***, p<0,05 x^2: 10,619			
Green parks	N	83	79	83	79	47	50	22	25
	%	76.1	68.1	83.0	63.2	66,2	67,6	88,0	73,5
		p: 0, 179, p>0,05 x^2: 0, 011		p: **0,001***, p<0,05 x^2: 10.804		p: 0,132 , p>0,05 x^2: 7,080			
Availability of proximate parks	N	58	62	58	62	37	37	19	19
	%	53.2	53.4	58.0	49.6	52,1	50,0	76,0	55,9
		p: 0, 972, p>0,05 x^2: 0, 001		p: 0, 527, p>0,05 x^2: 0, 401		p: 0,108 , p>0,05 x^2: 7,582			
Availability of sport areas in parks	N	50	68	47	71	39	43	12	16
	%	45.9	58.6	47.0	56.8	54,9	58,1	48,0	47,1
		p: 0, 056, p>0,05 x^2: 3,662		p: 0, 144, p>0,05 x^2: 2.139		p: 0,485 , p>0,05 x^2: 3,455			
Availability of walking tracks in parks	N	64	51	53	62	41	34	15	14
	%	58.7	44.0	53.0	49.6	57,7	45,9	60,0	41,2
		p:**0,027***, p<0,05 x^2: 4,893		p: 0,612, p>0,05 x^2: 0, 257		p: 0,381 , p>0,05 x^2: 4,188			
Well maintained parks	N	85	81	79	87	55	49	18	26
	%	78.0	69.8	79.0	69.6	77,5	66,2	72,0	76,5
		p: 0, 165, p>0,05 x^2: 1,931		p:0,111, p>0,05 x^2: 2.537		p: 0,354 , p>0,05 x^2: 4,401			
Safety of parks	N	87	82	81	88	59	50	18	23
	%	79.8	70.7	81.0	70.4	83,1	67,6	72,0	67,6
		p: 0, 114, p>0,05 x^2: 2.504		p:0,068, p>0,05 x^2: 3,339		p: 0,076 , p>0,05 x^2: 8,470			
Availability of establishments such as tea house/kiosk in parks	N	60	65	64	61	41	32	17	18
	%	55.0	56.0	64.0	48.8	57,7	43,2	68,0	52,9
		p: 0, 881, p>0,05 x^2: 0, 022		**p:0, 023***, p>0,05 x^2: 5,198		p: **0,019***, p<0,05 x^2: 11,829			

Depending on variety and quality of the services offered in urban parks such as the sampling areas of Altınpark, Gençlik Park, and Ahlatlıbel Park, the number of users increased. These parks offered activity opportunities such as exercising, sitting in tea houses/restaurants in open air, and doing picnic. Teenagers were seen to prefer parks offering such services more.

4. DISCUSSION

Parks are areas which are preferred the most by individuals for outdoor recreation. Primarily children, seniors and teenagers use parks frequently. Availability of green spaces is very important for teenagers to spend their leisure time in outdoor locations.

The parks that were explored are seen to consist of only seating units, children playgrounds and decorative pools. In order to increase park use, they must offer various play fields, picnic areas, and establishments such as tea house. Developing an identity for neighborhood parks will facilitate use and adoption of parks.

In this context, the accessibility criteria must be taken into consideration and accessibility to parks should be eased while building parks. Considering today's increasing crime rates, security personnel must be deployed in parks. It is believed that availability of areas for team sports such as basketball, volleyball, football, etc. will encourage young people to exercise.

Areas where young people can get together without different groups disturbing each other and other individuals around must be created in parks. Walking and cycling tracks should be offered in parks and young people must be provided with outdoor and natural areas to perform physical activities. Spaces allowing individuation as well as socialization must be created in parks.

Most of the parks in the study were seen not to have adequate horticultural elements and that instead, materials such as concrete, asphalt, etc. are saliently used. Use of structural elements must be decreased, and that of natural materials and horticultural materials must be increased. Use of natural and recyclable materials will undoubtedly support development of a healthy generation.

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Chapter 44

Evaluation of Landscape Architecture Students' Awareness of Their Career

Zöhre POLAT*

INTRODUCTION

Landscape and landscape architecture (LA) are among the concepts the meaning of which are not known and defined much in Turkey. In addition, the aim and scope of the works landscape architects do are not also fully known to students who will have to decide their department at university, people and decision makers. Such a problem may also be seen among the LA students who preferred and are introduced to the LA as an academic and occupational field for the first time. Students at high school may make their choice for LA as university department unconsciously and without searching the concepts like landscape, landscape architecture discipline, landscape architect and the scope of the works landscape architects.

Definition of basic concepts

The word "Landscape" in English and "Landschaft" in German has entered in Turkish as "peyzaj" coming originally from the French word "Peysage" meaning scene or view (Yücel et al., 2008). According to European Landscape Convention (ELC 2003), landscape is a field coming out as the result of the (inter)actions between natural and anthropogenic elements as perceived by people (Yücel et al., 2008).

Landscape architecture is a field of science studying on planning, designing, restoring and conserving natural and cultural components and environment considering sustainability in conservation - use balance inconvenience with the ecological, economic, aesthetical and functional criteria (Yücel et al., 2008). Landscape architecture is the profession which applies artistic and scientific principles to the research, planning, design and management of both natural and built environments. Landscape architecture represents a perfect example of a domain clearly intermingling with the surrounding environment (Palea, 2012).

Landscape architects carry out the works of planning, design, biological restoration, conservation and management. LA students are offered such educational programs at BSc degree in a 4 - year period.

Background of LA as an occupation

The first form of landscape architecture was introduced in a period until the 1800s, as mainly gardening based largely on the preparation of master plans and garden designing for the surrounding of significant religious, governmental or royal structures such as the works of André Le Nôtre at Vaux-le-Vicomte and Versailles Palace. Development of LA in American world was backed mainly by Frederick Law Olmsted

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and Andrew Jackson Downing whose book (in 1841 *A Treatise on the Theory and Practice of Landscape Gardening, Adapted to North America*) accepted to be the first book of its kind in the US. Another important development in the USA for LA is the foundation of the American Society of Landscape Architects (ASLA) in 1899, which was followed by the foundation of International Federation of Landscape Architects (IFLA) in Europe (Cambridge, England, in 1948) (Anonymous, 2015a).

In Turkey, in 2015-2016 educational term, totally 9 LA departments had student contingents for education in the body of agricultural faculties while 8 in architecture, 7 in forestry, 2 in architecture and design, 1 in engineering and architecture, 2 in fine arts, design and architecture and 1 in fine arts and design faculty (Anonymous, 2015b).

LA must keep the advantage it has gained because it uses the knowledge of landscape more widely than other related disciplines do. Detailed landscape design, creation of new spaces—new landscapes, and the use of characteristic live landscape material as well as nature protection, landscape ecology and regional landscape planning require both creative and scientific approaches (Gazvoda, 2002).

LA education begins basically with the presentation of general knowledge and fundamental concepts related to the occupation. In educational process, curricula prepared for LA students are composed by reviewing the contents of the subjects taught at Turkish and foreign LA departments. The same process was followed in also the preparation of the LA program in 2012 - 2013 educational term at Adnan Menderes University.

Recent studies focus on the development of a LA education system e.g. those about the education of landscape planning (Xiaoxiang,1986; Linke, 1986), landscape education and research at institutes (Zonneveld,1986), learning styles of landscape architecture students (Brown et al., 1994), underlying attitudes and values held by landscape architects (Thompson, 2002), characteristics of modern landscape architecture and its education (Gazvoda, 2002), observations regarding the education of landscape architects (Maruši˘c, I., 2002), educational skills in training landscape architecture students (Palea et al., 2012), opportunities for design approaches in landscape planning (von Haarena et al., 2014) and landscape engineering education (Khalilnezhada et al., 2012).

For Millot (2014), International university rankings are an integral part of the higher education landscape and awareness is the ability to establish the association between a known content and gaining knowledge at a higher level in a way which can include both of them (Anonymous, 2015c). The objectives of the present study are to (1) determine awareness level of the 1st grade LA students about their occupational field and (2) their grasping level of the content of school subject related to LA through the feedbacks taken at the beginning and end of the educational terms. In this respect, the answer to the following questions tried to be found in the study; (1) Did the student having actually preferred the LA department know the meaning or definitions of the concepts such as “Landscape”, “LA occupation”, “landscape architect” and “the works landscape architects” before they preferred the department? (2) To what extent did the same student group grasp and learn the aforementioned basic concepts in the questions in the scope of a lecture subject “Introduction to LA”? All data obtained were expected to determine students’ grasping levels of these concepts and their awareness levels of the LA occupation.

MATERIAL and METHOD

Material: LA department started education in the body of agriculture faculty at Adnan Menderes University in 2012-2013 educational terms. The study was conducted in 3 – year period over the 1st-grade students in the scope of one of their lectures "Introduction to LA" they attend in the first semester of their university education. These students were accepted to be the main material of the study.

The study included 32 and 28 (totally 60) students at the first and last lessons of 2012-2013 educational term, while in the 2013-2014 term, 31 and 26 (totally 57) students were surveyed at the beginning and end of the term. In the 2014-2015 term, totally 60 students (30 at the beginning and end of the term) were also included in the study. In a 3-year period, the study included 177 students, 93 of whom attended at the beginning and 84 at the end of the term. In order to determine data collection method, previous studies were reviewed in the related literature. Such references make up secondary materials of the study.

Method: The main methodology of the study is composed of five stages; data gathering from questionnaire survey, analysis of the mentioned data in convenience with the aims of the study and evaluation of the results by synthesising them, determination of the concrete outcomes based on the syntheses and ultimately proposal of some suggestions. The method of the study is given in flow chart in Figure 1.

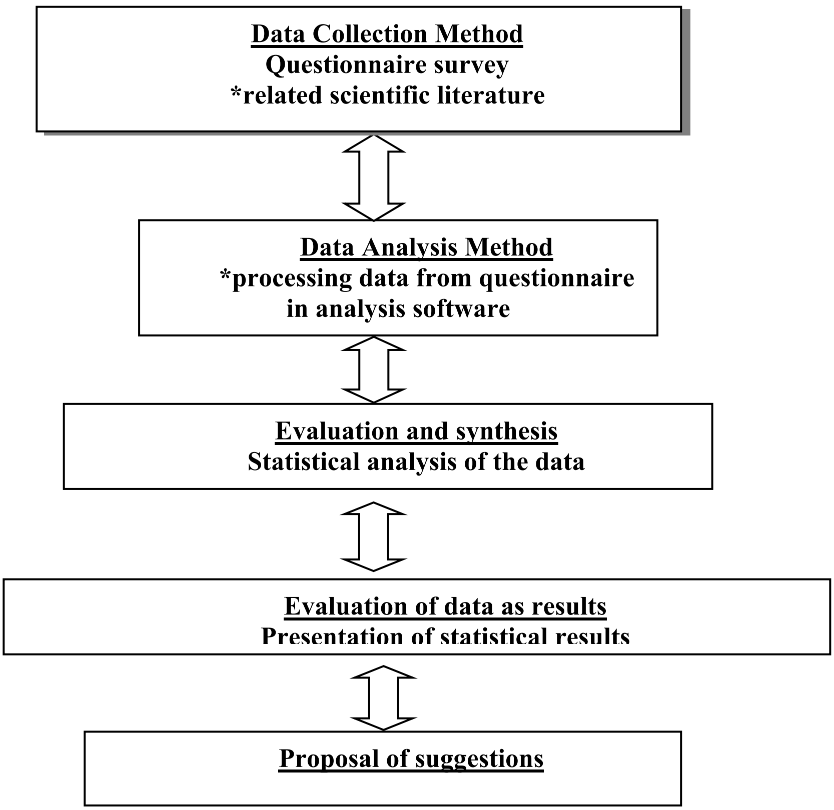

Figure 1. Flow chart of study method

Questionnaire preparation

The questionnaire was prepared to include clear and understandable questions to determine LA students' awareness levels about their future occupation. In the first part of the questionnaire, questions were related more to individual characteristics of the students while in the second part, the questions were about main occupational concepts in LA (Table 1).

A questionnaire survey was conducted in a two – staged procedure at different times over the 1st-grade students in 2012 – 2013 (first), 2013 – 2014 (second) and 2014 – 2015 (third) educational terms. At the first stage, questionnaire forms were completed by 1st grade LA students at the beginning of the semester when they got the first lesson of Introduction to LA as a class after the greetings. At the second stage, the questionnaire forms including the same questions were completed again the same students at the last lesson of the same class at the end of the semester. The number of students completing first and second questionnaire forms was different from each other. Main parts of the questionnaire are given in Table 1.

Table 1. Parts of the questionnaire form

Individual (demographic) characteristics
Age
Gender
Marital status
Family income
Determination of the awareness related to LA as an occupation
Meaning of the word landscape
Definition of LA as a concept
What are LA and its meaning?
Content of LA as an occupation.
What does a landscape architect do?

Statistical analysis

A statistical software SAS (1999) package was used for the statistical analysis. A nonparametric hypothesis test was preferred since data did not show normal distribution. Mean values and Related Samples were compared through Wilcoxon Signed Rank Test.

RESULTS

Results of the first and second stage questionnaires conducted over 3 years are given below. Table 2 represents the individual (demographic) characteristics of the students (Table 2) while Tables 3, 4 and 5 presents their awareness level related to LA as an occupation.

Demographic characteristics of the students

The majority of the students are in 15 – 24 age group (100%, 96.2%, 93.3%, in the first, second and third terms, respectively) while again their great majority is female and all are single (100%). It was found for the family income that most of the students in the first year come from a family with monthly income of 2000-3000 TL (40.6 and 42.9% in the first and second surveys respectively) while in the second year they come from those with 1000-2000TL monthly income (58.1% and 50.0% respectively). In the third year, families have a monthly income of 1000-2000TL (43.3% and 33.3% in the first and the second questionnaires respectively) (Table 2).

Table 2. Demographic characteristics of the students

Demographic characteristics	1st Year		2nd Year		3rd Year	
Questionnaires	**First**	**Last**	**First**	**Last**	**First**	**Last**
Age distribution (15 – 24) (%)	100	100	100	96.2	93.3	93.3
Age distribution (25 – 39) (%)				3.8	6.7	6.7
Marital status single (%)	100	100	100	100	100	100
Marital status married (%)	-	-	-	-	-	-
Family income (1.250-500TL; %)	-	-	3.2	7.7	6.7	3.3
2.600-1000TL	12.5	14.3	12.9	19.2	30.0	20.0
3.1000-2000TL	28.1	28.6	58.1	50.0	43.3	33.3
4.2000-3000TL	40.6	42.9	22.6	19.2	16.7	33.3
More than 5.3000	18.8	14.3	3.2	3.8	3.3	10

Results related to students' awareness level of their occupation

It was determined from the first questionnaire of the 1st year (32 participants) that students' answers to the questions were away from the right ones (100%) while in the last questionnaire of the same year (28 participants), students were found to give right answers to all the questions related to LA concept (100%), LA as occupation (100%) and the meaning of the word landscape (100%) (Table 3).

Table 3. Awareness levels of students in the 1st year

Questions	Answers	First (%)	Last (%)	P
Definition of LA as a concept	**True**		**100**	**0.000**
	False	**100**		
Content of LA as an occupation.	**True**		**100**	**0.000**
	False	**100**		
Meaning of the word landscape	**True**		**100**	**0.000**
	False	**100**		
What are LA and its meaning?	**True**		**75**	**0.000**
	False	**100**	**3.6**	
	Incomplete		**21.4**	
What does a landscape architect do?	**True**		**100**	**0.000**
	False	**100**		

Related Samples Wilcoxon Signed Rank Test

Content of the LA as an occupation was known by 75% of the students in the first questionnaire in 1st year while the question was answered incompletely and falsely in the rates of 21.4% and 3.6% by the students, respectively. The question related to what a landscape architect does was answered truly by all the participants (Table 3).

It was found from the results of first questionnaire completed by 31 students in the 2nd year that only 6.5% of the students knew the definition of LA as a concept while 16.1% did not even answer the question. They did not know LA as an occupation in the rate of 83.9% while again 16.1% did not answer the question. Students had true idea about the meaning of landscape as a word only in the rate of 9.7% while 77.4% of them had the wrong idea and 12.9% could not answer the question. About the meaning of the

LA, 3.2% of the students answered truly the question while 80.7% gave wrong answers and 16.1% did not answer. Students gave wrong answers to the question related to what a landscape architect does at the rate of 90.3% while 9.7% of them could not answer the question. In the last questionnaire of the 2nd year, 26 students participated and their answers were completely (100%) true about the concept and occupation of LA. For the meaning of landscape as a word, they gave true answers in the rate of 80.8% and 15.4% gave wrong answers while 3.8% could not answer the question (Table 4).

Table 4. Awareness levels of students in the 2nd year

Questions	Answers	First (%)	Last (%)	P
Definition of LA as a concept	True	6.5	100	**0.000**
	False	77.4		
	Unanswered	16.1		
Content of LA as an occupation.	True	-	100	**0.000**
	False	83.9		
	Unanswered	16.1		
Meaning of the word landscape	True	77.4	80.8	**0.000**
	False	100	15.4	
	Unanswered	12.9	3.8	
What are LA and its meaning?	True	3.2	61.5	**0.000**
	False	80.7	23.1	
	Unanswered	16.1	15.4	
What does a landscape architect do?	True		69.2	**0.000**
	False	90.3	23.1	
	Unanswered	9.7	7.7	

Related Samples Wilcoxon Signed Rank Test

For the meaning of LA, 61.5 and 23.1% of the students gave true and wrong answers respectively while 15.4% could not give any answer. Related to the work of landscape architect, 69.2% of the students answered truly the question while 23.1% gave the wrong answer and 7.7% could not give any answer (Table 4).

Table 5. Awareness levels of students in the 3rd year

Questions	Answers	First (%)	Last (%)	P
Definition of LA as a concept	**True**		**100**	**0.000**
	False	**100**		
Content of LA as an occupation.	**True**		**100**	**0.000**
	False	**100**		
Meaning of the word landscape	**True**	**6.7**	**96.7**	**0.000**
	False	**93.3**	**3.3**	
What are LA and its meaning?	**True**	**3.3**	**73.3**	**0.000**
	False	**96.7**	**16.7**	
	Unanswered		**10**	
What does a landscape architect do?	**True**		**100**	**0.000**
	False	**100**		

Related Samples Wilcoxon Signed Rank Test

It was found from the results of the first questionnaire completed by 30 students in the 3rd year that none of the students knew the definition of LA as a concept and occupation while only 6.7% of them had true idea about the meaning of landscape as a word and the rest did not (Table 5).

About the meaning of the LA, 3.3% of the students answered truly the question while 96.7% answered wrongly. Students gave completely (100%) wrong answers to the question related to what a landscape architect does. In the last questionnaire of the 2nd year, 30 students participated and their answers were completely (100%) true about the concept and occupation of LA. For the meaning of landscape as a word, they gave true answers in the rate of 96.7% while 3.3% gave wrong answer (Table 5).

For the meaning of LA, 73.3 and 16.7% of the students gave true and wrong answers respectively while 10.0% could not give any answer. Related to the work of landscape architects, all (100%) of the students answered truly the question (Table 5).

CONCLUSIONS and DISCUSSION

According to Kuzgun (2000), career is the most important source of an individual's identity and accepted to be an activity field enabling people to have a place in society, establish relationships with others and experience the sense of being beneficial to community (Demiray et al., 2013). Choice of profession may be the most important breakthrough to direct and determine his/her position in one's life.

According to Kuzgun (2016), universities have 3 basic functions; scientific research and production of knowledge, bringing up professionals and provision of culture. What should be known in the preference of profession and career is that one should first know her/himself, seek the alternatives, search occupations to know which one fits her/his qualifications through some documents like those prepared by ÖSYM (Student Selection and Placement Center) and make a decision (direction to a certain choice).

After following such a process, a student can make accurate decision to direct her/his future by knowing the meaning, content, concept and field of the occupation he/she preferred. In the present study concentrated on such an aim, awareness level of 1st grade LA students was determined related to their occupation through feedback taken from the beginning and end of the semester by considering grasping level of basic concepts of LA in the scope of a class Introduction to LA.

Results of the study seem to be interesting

The majority of the students are in 15 – 24 age group in three years (100%, 96.2% and 93.3%, respectively) and female (Table 2). It is clear that the LA department is preferred more by female students.

All the students are single (100%) since they continue their education after high school. Family income is higher among the 1st year's students than others (Table 2). Even though Graetz et al. (1979) stated that socio-economic status (SES) plays a big role and gives substantial impact to students in making their decisions to enrol at Higher Educational Institution –HEI (Misran et al., 2013) and also it is mentioned that financial cost has the most significant effect on their selection of the universities (Shammot, 2011). But the present study could not show any clear and statistically significant effect of family income on awareness rate of students.

As the result of the analysis, it was found that in the 1st, 2nd and 3rd year, 1st grade LA students preferred the LA department unconsciously and without knowing the LA as an occupation adequately. In other words, they have no awareness of the occupation when preferring it (100%; Table 3, Table 4, Table 5). Reasons for this will be the subject of another study.

The results are painted a negative picture for Landscape Architectural education.

But they must be used in future career programs to awareness.

Similar studies could not be seen as the result of a literature review, however; in some studies, effective factors on occupational preference were evaluated to direct students to a decision.

In Sarıkaya and Khorshid (2009)'s, it was reported that students largely had positive opinions for the occupation they preferred. In addition, entrance exam scores and score types, rankings of the preference, educational level and occupation of mother are accepted by the authors to affect students' occupational preference. In another study, opinions of candidate nurses about occupational preference and application (Şirin et al., 2008). Çakar and Kulaksızoğlu (1997) compared occupational maturity level of students at the last grade of high school with their focus on audit levels.

Subjects of the studies reviewed are related mainly the career preference and decision-making process of high school students (Germeijs, et al., 2012; Germeijs and Verschueren, 2006 and the factors effective on the career choice (Korkmaz, 2015).

In this research has a different subject with above researches, but has a main base with these researches.

All the research results serve as a template for the proposal of suggestions in the result part of the study. It was also investigated over 3 consecutive academic years (2012-2013, 2013-2014 and 2014-2015) whether students at the same grade could grasp main LA concepts through the present educational procedures. A statistically significant difference was found in the study between all the answers students gave to all questions (p=0.000). Results of the first and last questionnaires were compared statistically to each other. In the Ho hypothesis, educational process was determined to have no effect on learning main concepts. H1 claimed that educational process had effects on learning basic concepts and Introduction to LA class contributed positively to learning basic concepts.

It was seen when compared the results obtained from her results of the first and last lessons of the semester that in educational terms, students could grasp and adapt main occupational concepts. They are said to have raised awareness after they attended such a class about LA (Table 3, Table 4, Table 5).

Career awareness is accepted to be a process experienced by the individuals related to or interested in the occupational field in question to discover the definition, content, employment and economic possibilities of the occupation to be preferred and what a person will and can do in this field actually shaping their own lives. Such a process is combined and elaborated with students' dreams and ideals beginning in primary school age, suggestions from families and teachers and their field observations.

Some proposals were suggested to avoid negative outcomes among LA students related to their awareness conditions of their career.

Students who should be aware of what they will experience in their preferred occupational field should also;

- Know that they prefer not only their profession but also their shape of life in the future,
- Know themselves, search for their alternatives in occupational fields and decide.
- The best way of that is to learn the definition, content, employment and economic possibilities of the occupation to be preferred and what a person will and can do in this field (Kuzgun, 20016).

- Make a self – evaluation related to whether they have suitable physical or psychological characteristics for the occupation.
- Have self – confidence of that they can make their decisions in the preference of their career after doing the things mentioned above.

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Chapter 45

Urban Design

Murat ÖZYAVUZ*

INTRODUCTION

Urban design describes the physical features that define the character or image of a street, neighborhood, community, or city as a whole. Urban design gives form and definition to the full spectrum of forces - cultural, ecological, economic, political, social, aesthetic - that shape the built environment and the public realm. Urban design, urban nature of chaos and intensity, is an action that the destruction of the values of the past and reveal the development of appropriate new lifestyle. Urban design is the visual and sensory relationship between people and the built and natural environment. The built environment includes buildings and streets, and the natural environment includes features such as shorelines, canyons, mesas, and parks as they shape and are incorporated into the urban framework. A dynamic concept of urban design, is an action that can change the space defined by the difference. According to this object is defined in urban design different content.

URBAN DESIGN

Urban design concept has been treated with different contexts and scopes since the 19th century. In this process, different definitions have been made by different theoreticians and practitioners who study in this area. In parallel to the studies and debate raised by these theoreticians and practitioners, a structure that has conceptualized the urban design has been observed. Due to a set of definitions urban design is described as a system of change in structured and natural environments. Judging by this definition, urban design seems close to urban planning. Urban design is closely linked to architecture, city planning and particularly to landscape architecture. However, the most important thing is that all these domains can reflect their professional quality to urban design (Türk, 2012).

Urban design is the visual and sensory relationship between people and the built and natural environment. The built environment includes buildings and streets, and the natural environment includes features such as shorelines, canyons, mesas, and parks as they shape and are incorporated into the urban framework (Urban Design Element, 2008). The aim of urban design is to create productive, habitable and sustainable spaces. In order to accomplish that, it covers masses completely, creates economic spaces, invents designs that can integrate and promotes environmental responsibility. Urban design is an act which reveals the complexity and intensity that stems from urbanization, disappearance of values from the past and emerging of new life styles that can adapt to developments.

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Quality Urban Design

- **productive**
- **liveable**
- **sustainable**

Figure 1. What is urban design?

Urban design introduces new ideas about the problematic issues of present zoning structure that urban planning cannot solve. At the same time, it is a new discipline that supports traditional disciplines and removes the inadequacies in problem solving. In other words, urban design is an act that reveals the complexity and emptiness that stem from urbanization, disappearance of values from the past and new life styles that can adapt to developments (Çubuk, 1991). Urban design is an "urban, structural and stylistic" design that is about the arrangement of physical objects and humane activities in space.

If we define urban design in detail, it plays a very important role in resolving the relationship between city dwellers and social, economic, spatial, political, and structural and spatial patterns; analyzing the needs in the development of social service systems; integrating private sector investments and public order; and in particular finding a balance between supervision of city structures and connection to the past.

The main quality of urban design is arranging physical objects with humane acts in a suitable space. Urban design is specialty that plays a role in actualizing and developing the "city outdoor spaces" by designing it. Thus, urban design is the connection point of architecture, landscape engineering and urban planning. It takes it content from the design of architecture and landscape engineering, and environmental management and social sciences traditions of contemporary planning.

Urban design as a means of arrangement of sustainable space, it can;

- Find macroform different spaces in national, regional, metropolitan city and urban subscales.
- Create developmental corridors and axes on different scales.
- Establish principles for inspection for industrial zone areas.
- Determine mass urban project zones and environmental criteria.
- Assign conservation areas for cultural heritage, and status and arrangement of sensitive positions.
- Install recreational spaces, natural reserves, open spaces and outdoor systems.
- Establish principles by defining aesthetic response areas in the urban entirety.
- Produce urban landscapes and new landscape values.
- Introduce housing areas, city centers, special project zones and regulation principles.
- Determine principles for the arrangement of urban and public spaces, and show activity in designing urban micro-space and provide outcome.

The aim in urban planning is to provide city-dwellers with a certain life style, maintain environmental integration in urban design, and qualify the present spaces. Urban design is a benefit when arranging urban outdoor spaces, establishing bond between spaces, maintaining a well-proportioned bond between people and environment and accomplishing aesthetic value in the city.

Urban different topics scope of design work, increase the domains of these studies. For this purpose, many studies have been made. Generally, urban design can significantly influence (An Urban Design Protocol, 2011).

Table 1. Urban design influence

the economic success and socio-economic composition of a locality;
whether it encourages local businesses and entrepreneurship; whether it attracts people to live there; whether the costs of housing and travel are affordable; and whether access to job opportunities, facilities and services are equitable;
the physical scale, space and ambience of a place;
It provides balance between the built environment with the natural environment the social and cultural nature of a locality;
the social and cultural nature of a locality;
how people interact with each other, how they move around, and how they use a place.

The main feature of urban design is arranging the physical objects that constitute the environment and social acts in space. The first and the basic feature is that urban design is directly concerned with a solid and three dimensionally built environment.

Lynch (1990), in his book *City Sense and City Design*, indicates that urban design deals with the formation of urban environments and in this regard organizes the elements and materials of urban design as follows;

Space: positioning of public domains, establishing the bond between scale and form.

Visible activity: creating spaces for various activity groups and arranging the space accordingly.

Sequences: catching images that follow a sequence.

Communications: conveying meaning to the audience via symbols.

Surfaces: all surfaces particularly ground and walls of the city, rock, earth and water, and plants.

Details: road gullies, benches, billboards, stairs, signboards etc.

Human, habitat, habitat quality, urban living quality, life quality are key words in urban design. These key words define the objectives, questions and working areas. Urban design not only approaches the physical qualities – visible qualities of the physical environment but also deals with immaterial – invisible qualities of the physical environment. This cooperation brings about environmental quality with dwelling, and by extension life quality. As the aim is increasing the life quality in urban design, living environment of the urban people is an important criteria. In this environment, a person fulfills their physical and social needs.

Core principles of Urban Design Project are;

- Establishing a space setup related to the environment with super scale.
- Providing consistency, identity and the need to acquire meaning in urban standards.
- Raising a design approach that features the natural, cultural, historical, aesthetic and visual values of the region and environment.
- Providing easy and safe transport in terms of transportation regulations; making the necessary regulations for the handicapped, children and senior citizens etc. who have a limitation of movement; providing public transport, pedestrian walks

and cycle lanes.

- Developing solutions for the positioning of buildings and their interactions among themselves, open spaces and landscape arrangements that occur after the positioning of buildings, and pedestrian and traffic issues that are the least harmful for the environment and the most useful and aesthetic.
- Improving the quality of urban life.
- Creating qualified public open spaces.
- Making use of sustainable natural resources like wind, sun, and rain water within the scope of projects in order to minimize energy and sourcing; taking precautions on green fiber and landscape plans to contribute to the urban climate by preventing energy loss and reusing waste to minimize the negative effects on the environment.
- By including social conference procedures, giving information to dwellers who will benefit from projects, urban settlers, trade associations, and nongovernmental organizations about the urban design projects initiated by authorities and finalize this process by analyzing the opinions and suggestions with official petitions.
- Maintaining the integrity between spatial, environmental and social norms and planned regulations.

Urban design work, the city's socio-economic, historical, natural, cultural obliged to analyze the data.These reasons, urban design involves many different disciplines including planning, development, architecture, landscape architecture, engineering, law and finance Urban design operates from the macro scale of the urban structure (planning, zoning, transport and infrastructure networks) to the micro scale of street furniture and lighting. When fully integrated into policy and planning systems, urban design can inform land use planning, infrastructure, built form and even the socio-demographic mix of a place (Cairns Esplanade Redevelopment, 2011).

Townscape is the urban composition of landscape. It describes the facultative organization of urban environment. Furthermore, it is the connection between buildings as a whole – instead of individually – and their connection to the urban unstructured spaces in the urban complex. Also it is the exhibition of buildings in the urban streets and spaces with informal concerns.

All urban members and elements that constitute the urban environment are used in townscape. These are nature, trees, water, traffic, billboards and urban furniture as well as buildings. The secondary importance of townscape is their exhibition. The exhibition of these elements that constitute the urban environment is important. Nevertheless, while creating the townscape, contribution of demographic structure, sociology, engineering, transportation and all data that is about human are needed.

According to Goulty (1990), townscape is a three dimensional composition composed by cultural (infrastructure) and natural (earth, water, plants etc.) agents which creates a bond between buildings and spaces that provide the basic characteristic of constructed areas.

Townscape can be analyzed in two main groups;

- Exterior townscape is the landscape value that moves from the outskirts of the site which the town has been built on into the urban entirety. In short, it is the perception of urban silhouette.
- Interior townscape are the perspectives perceived while walking through the

town. Interior design concept is shaped with urban morphology.

Combination of exterior and interior townscapes gives us the ultimate townscape concept. The image of the town is stable. Human is the mobile one. Human shapes the town in his mind by perceiving it from different perspectives. He acquires a different urban image in every place he looks at. Thus, more than one urban image is possible.

Acquiring the artistic values of a town is possible with analyzing the interior design i.e. by walking through it. In addition to this, a bond between exterior design and art is also possible. Creating a harmonious, beautiful, and accurate, with a sense of spirit, understandable urban design where one can find urban aesthetics can be accomplished with urban design projects. Design in general, and urban design in particular, above all, is an expression of history and geography. Urban design is a crucial element of townscape process.

URBAN DESIGN OBJECTIVES

Urban design is a rationalistic design technique that arranges different functions with different purposes. Thus, there is a variety of objectives of urban design. (Department of the Environment, Transport and the Regions, 2000).

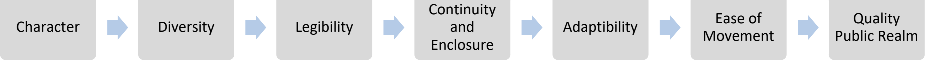

Figure 2. Urban design objectives

Character (a place with its own identity): Towns may introduce different images to its dwellers and guests. These images can be architecture, landscape or a historical building, fountain or a monument in a public space. Also the infrastructure, straight streets, and avenues that constitute a linearity to a square can make it more identifiable.

Diversity (a place with variety and choice): This makes a holistic analysis of difference in housing and building varieties that are in culturally different neighborhoods. It creates powerful social networks with social activity spaces for everyone.

Legibility (a place that has a clear image and is easy to understand): Easy and plain patterns in neighborhood and town scale provide the dwellers to make their own arrangements easily. This type of development models cover grid systems. This grid system also provides easy access and alternative routes.

Continuity and Enclosure (a place where public and private spaces are clearly distinguished): Permanent dwelling forms that face the street describes where people are and their direction. While constituting this structure, open spaces and different functions are important.

Adaptability (a place that can change easily): Neighborhoods and towns that are constantly changing should be socially, technically and economically adaptable in form and structure.

Ease of Movement (a place that is easy to get and more through): Old neighborhoods in towns generally provide maximum accessibility in terms of pedestrian walking. A compact grid network that is transit and pedestrian-centered provides maximum accessibility.

Quality Public Realm (a place with attractive and successful outdoor areas): Public spaces are important components of neighborhoods and cities. Such spaces provide attractive, safe and comfortable spaces in terms of architectural applications.

In short, urban design is concerned with the arrangement, appearance and function of our suburbs, towns and cities. It is both a process and an outcome of creating localities in which people live, engage with each other, and the physical place around them.

Good urban design is characterized by, among other things (Ruvin et al., 2011) (This chapter has been taken directly from the urban design manual publication)

Well-defined open spaces - Well-defined open spaces are an important component of urban design and are an integral element of a neighborhood. Streets, buildings or landscape should clearly define the edges of open spaces.

Defined block edges - Defined block edges help form the physical containers of public space. Block edges are defined by buildings placed close to the street following uniform front setbacks.

Interconnected street network - An interconnected street network improves mobility by providing more options to reach a destination and the dispersal of traffic, as well as by making it easier for pedestrians to access more direct routes between destinations.

Human scale - Human scale is the relationship of space and objects to the proportion and capability of the human body. For a public space to feel comfortable, the individual must experience a positive relationship to the space. Human scale is the basis of urban design as it pertains to the dimensions of objects and spaces including block sizes, street widths, walking distances, building heights and architectural details (Fig.3).

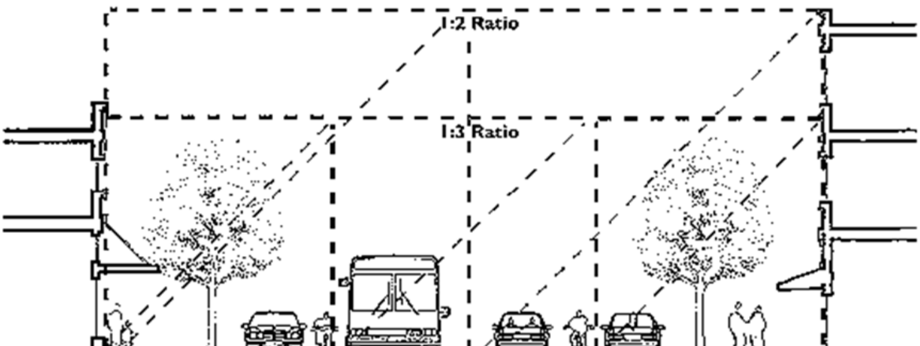

Figure 3. Human scale (human+planting+building+road) (http://www.ite.org/css/online/DWUT04.html)

Focal points - Focal points are elements that provide visual identity and a sense of uniqueness within the community. They include such elements as squares and greens, fountains and statuary and important civic buildings or any other space or form that helps identify a particular neighborhood. Focal points should be placed in prominent locations or terminating street vistas.

Variety of building types - A variety of building types accommodates different uses, lifestyles and enhances a sense of community. Neighborhoods should be designed to elicit a diversity of building types, uses and residents.

Walkability - Walkability is a measure of ease in which pedestrians move through a community. Walkability has health, environmental and economic benefits; and it is influenced by the presence of sidewalks, block dimensions, building accessibility, traffic and safety among other factors.

Sustainability - Sustainability is the ability of communities to minimize their impact on the environment, in order to create neighborhoods that endure. Sustainability incorporates a community's natural resources as integral features of its design.

ELEMENTS of URBAN DESIGN

Urban design covers elements on different scales starting from macro scale and going to micro scale. These elements can sometimes be urban entirety and sometimes sitting sets. The important thing is to establish a connection between these elements and reflect it in design. Urban design elements used for this are as follows (Cairns Esplanade Redevelopment, 2011);

Urban Structure: It covers urban structure, land structure, parcel arrangements, building forms, avenue and street networks, open and green spaces and the connection among them. It also constitutes all infrastructure and transportation systems.

Urban Grain: These are smaller cores in urban spaces. They can be neighborhoods or suburbs. It covers block structure arrangements in these places and transportation network. It analyzes avenue-street network in detail.

Density +mix: It shows development intensity. For instance, it analyzes the density of housing, trading, public, recreational and shopping spaces of a town.

Height +massing: It analyzes the height of buildings that surround housings and streets, and their relationship with floor spaces. It also shows the connection between the urban structure and human scale.

Streetscape +Landscape: it covers public open and green spaces and their landscape design. In order to do this, it analyzes all ecological factors of subscale.

Facade +Interface: It works on building complexes, streets and neighboring buildings (the space between them) and their facades (pattern and materials) in terms of architectural expression and urban design.

Details +Materials: It analyzes solid and smooth surfaces in terms of fabric, color, craftsmanship, sustainability and restoration. It checks upon equipment like lighting, sitting sets, or trash bins. It analyzes public property in terms of human comfort and safety.

Public Realm: Majority of urban design projects are carried out in public spaces. Public spaces are natural or constructed environments like parks, squares, plazas that people use. Such places contribute to the urban silhouette and structure along with private spaces (Figure 4.).

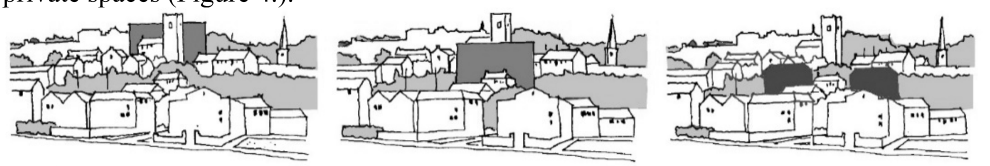

Figure 4. Understanding urban design

Skylines are sensitive to being obscured by high buildings in front of existing buildings or having their silhouette spoiled by high buildings behind them

Topography +Landscape: This comprehensive concept includes natural preserves (lakes, rivers etc.) and the topography of these places. Also, it analyzes the landscape arrangements of public and private spaces and the effect of these arrangements on urban entirety.

Social + Economic Fabric: It covers social factors (cultural, medical etc.) as well as production capacity, and non-physical sides of urban form that includes the economic welfare of the society.

STAGES OF URBAN DESIGH PROJECTS (TURKEY CASE)

An urban design project is prepared on two stages, by analyzing upper scale plans and present construction plans together, and by taking the quality and authenticity of the working place into consideration, on the condition that it is developed according to the institution's request and kept hidden.

a. Analysis – Confirmation covers

- General information on the area (place, location, administrative boundaries, connection to the environment etc.)
- Environmental effect and adaptation to the city (analysis of the silhouette, its place in the urban transportation system, social and technical infrastructure qualities etc.)
- Natural structure analysis (slope, topography, climate and meteorological data etc.)
- Physical structural analysis (land use, property conditions, floor functions, floor numbers, condition of transportation (vehicle- pedestrian), noise and light pollution etc.)
- Cultural structural analysis (cultural history, traditions, life style and choices, demographic structure, social and economic status etc.)
- Characteristic space analysis (analysis of physical design factors like urban morphology, open and constructed spaces, street fabric, urban fabric qualities, density focuses, borders and coasts etc.)
- Present planning resolutions
- Open space analysis (public and private open spaces, squares, streets, gardens, parks etc.)
- Determining the quality, tendency and needs of consumers.
- Principles of Urban Design Projects cover
- Transportation and roaming (on/off the island, motorized vehicles, pedestrian walks, cycling roads, short and long term parking spaces, rings) and designs of open and closed spaces.
- Mass regulations (façade, garden spaces, distance between masses, façade typologies and projects etc.)
- Vertical and horizontal distribution of functions.
- Natural and artificial design factors that are used in the project and general design decisions on the area.
- Infrastructure projects (sustainable lighting, grey water, drainage and smart network systems)
- Three dimensional modelling of profile, silhouette and all bodies in the project in accurate scale and number.
- Urban design project report.
- Application of design directory principles.

RESULTS

Development and change of the urban spaces due to the growing dynamism have caused urban spaces to get alienated and irrational with its surrounding. As a result of globalization, a transfer to the information era and sustainability and such developments, changes in the urban environment are visible. From this perspective of change and development, today's cities and environment are the expression of an irregularity that the nature-human-society connection has failed to establish healthily. In this respect, urban design is needed and of crucial importance in order to accomplish a unity in urban organization, provide harmony and scale, and form the ever-changing characteristic of contemporary cities.

By taking the qualities of the area into consideration and with the aim of protecting, renovating and developing, and in respect to the basic principles of design and a holistic construct, urban design aims to create environmentally responsible, observer of natural and ecological values, rich with social and cultural equipment, sustainable, livable, and qualified living spaces.

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Chapter 46

Stormwater Management in the Context of Sustainable Drainage Concept in Urban Areas

Elif BAYRAMOĞLU*, Öner DEMİREL**

INTRODUCTION

Urban areas are specifies points in respect to the appropriate execution of functions oriented towards the landscape ecosystem. In addition to being areas where anthropogenic activities are concentrated, these points are ecosystems which accommodate natural structures and systems and the reciprocal interaction of cultural and natural structures. The balanced and healthy maintenance of ecosystem functions at cities can be possible through planning criteria which treat cities with a perception of ecosystems (Yaman & Doygun, 2014). Urban ecosystems contain rural area elements such as climate, hydrologic structure and vegetation (Pauletit & Duhme, 2000).

There is a relationship between urban texture organizations at urban areas and infrastructure systems. While in the past, water used to be a central concept for the history of humanity being shaped with life, currently, as water has been neglected, the cycle of water has been spoilt by and its integrity with the city has been forgotten (Stokman, 2008). As a result, environmental pollution has increased and an urban texture lacking green areas and urban infrastructure has emerged (Sandal & Karademir, 2013).

Together with the urbanization process, in line with the needs and requirements of urban people, hard ground surfaces have increased. As the density of population increases, environmental pollution increases, green areas decrease and the balance between the functional areas and natural areas in the city is spoilt (Gül, Nayır & Eraslan, 2007). The increase of the watertight and hard surfaces in urban areas has in turn caused a decrease of open-green areas. As a result, after precipitation, the rainwater in the natural water cycle does not infiltrate into the soil enough and accumulate on the surface (Müftüoğlu & Perçin, 2015). In addition to this, green areas are points where the city breathes and where the energy flow and movement in favor of the living organisms is sustained. The most important element in providing a sustainable balance in ecosystems is green areas (Tokuş, 2012). Therefore, the decrease of the green texture in urban areas affects the city not only functionally and aesthetically.

The increase of watertight surfaces in urban areas destroys the water cycle and affects the transmission and storage of water directly. Especially, rain water produced by irregular and sudden precipitation flows through hard and watertight surface

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coverings and accumulates at low elevations along the slope. When water accumulating at low elevations gets out of control, it causes serious problems such as floods and overflows caused by rainfall (Butler & Davies, 2004, Dunnett & Clayden, 2007). This situation becomes even more worth noticing during sudden and dense precipitation. The outcomes have led planners to seek new approaches towards the solution of problems at many areas. One of these approaches is an application study in the scope of rainwater management. Sustainable approaches should be provided in a way to create infrastructure landscapes at urban and regional forms in the natural cycle by evaluating natural and structural elements together. For this reason, the creation of infrastructure systems with an ecological approach should be supported by innovative and holistic approaches. For all these reasons, it is possible to create green infrastructure systems in the scope of 'landscape as urban infrastructure' since landscape elements contain natural ecological principles when they are handled in the scope of sustainability. It is possible to provide rainwater management by using the landscape's own form and texture of and by evaluating its aesthetical qualities.

The structure of the nature and the ecosystem has been damaged with urban conversion. Among the results of damaged hydrologic cycle are; overflow of the sewage and contamination of waterways because of urban surface flow, land collapses because of the distortions in the base water level and the urban residents who are deprived of experiencing the basic life power of the water. The urban infrastructure which was set up in order to include and reinforce natural processes has damaged these processes in the end. As a result, the urban structure has to be re-examined in order to create an urban landscape where the existence of water will be apparent (Oğuz & Çakcı, 2010).

Rainwater management is suggested as a solution for supplying water at rural areas especially in developed countries. In order to benefit from rainwater at maximum level, rainwater management has emerged with the purpose of developing the most suitable strategy for that region. It is possible to obtain water for use by accumulating rainwater and by purifying it when needed (Kantaroğlu, 2010).

Urban infrastructure-landscape relation

Landscape is important as a water infrastructure system at urban areas for urban ecosystem to function optimally and to be experienced. Beyond being an "object" which is being perceived and designed as a covering for all structures, the landscape has to be a variable organism, a "subject" which hosts important functions. This approach brings along a series of similar approaches. One of these is the perception of landscape as "an urban infrastructure" (Sert & Eşbah Tunçay, 2013). Landscape as urban infrastructure creates integrity and harmony within the hydrologic cycle in nature.

With the emergence of water infrastructure systems, water has become a visual and spatial element of landscape by strengthening natural physical landscape structure. It was able to create synergy with the other important urban functions by serving as an area network in order to meet the social demands of people. However, the pressure increasing because of urbanization, density and speed has caused any form visual water infrastructure to disappear (Oğuz & Çakcı, 2010).

Traditionally, cities bring together some problems in terms of commitment, security and sustainability. These problems should be designed as 'natural', 'dynamic' and 'functional' within the facilities of urban infrastructure. This is because landscape is the whole of sustainable functional elements which is stipulated by the nature and which can imitate some structures (Blood, 2006). In fact, urban infrastructures are a part of landscape. It is impossible to differentiate and evaluate cities from landscape. In urban landscapes, to blur the border between landscape and infrastructure, intersecting the functions of two or more systems in the same physical space on top of each other, is in fact depicted as the design of landscape as an urban infrastructure. In terms of the movement of water, its function and its organization in the scope of its aesthetical concept, landscape design as urban infrastructure presents functional methods (Sert, 2012).

Stormwater management in urban areas

The method of collecting rainwater is the collection of water which flows in line with the slope in the most suitable way with the typography. The basic objective of the method is the storage and keeping of ground and surface water in order to provide water to use when resources are scarce. It is possible to define urban rainwater management as a series of precautions for the removal of the remaining water out of the useful part without damaging the urban infrastructure and the superstructure (Demir, 2012; Müftüoğlu & Perçin, 2015).

In addition to the ecological benefits of the method, it also has social benefits for people in terms of sustainable landscape management (Wolf, 2008). In the method; the areas of surface flow or collection are roofs, courtyards, streets and squares, small soil surfaces, sloped areas and large basins which feed seasonal flows. During the rainwater collection method, water which flows along the slope is collected according to a specific method. The method of collection is usually advantageous because it is cheap and easy avantajlıdır (Gleick, 1998; Kantaroğlu, 2010). Especially in the recent years, sustainable approaches have emerged instead of traditional methods at urban areas in the scope of rainwater management. The most preferred of these approacvhes are; Australian origin design Water Sensitive Urban Design (WSUD), British origin Sustainable Urban Drainage Systems (SUDS) and US origin Low Impact Development (LID) (Karakoçak, 2011). Suitable areas for the implementation of the method are arid, semi-arid or semi-humid areas; areas where the distribution of precipitation between seasons is irregular and where the water supply is lower than the plant water need because of reasons such as high temperature; areas where annual precipitation exceeds 150 mm and drops in winter season; areas where annual precipitation exceeds 200 mm and drops in summer season (Sharma, 2008; Kantaroğlu, 2010).

Rainwater management at urban areas is carried out by using structural rainwater collection systems such as biological collection areas, in other words rain garden, pervious flooring, dry well, rain moat, roof garden, rain barrel and cisterns, canals, pipes and loopholes (Çakıroğlu, 2011). It is mentioned that rainwater from stormwater management to slow down,; green roofs, rain garden, structed wetlands, rain water tanks an planted areas in this section.

Green roof

At urban areas, while the water usage increases with the technological improvements, the decrease in soil absorbing rainwater causes the waste water systems of the city to overload. Floods caused by inadequate infrastructure systems increase as a result of precipitation. One of the most effective remedies for this situation is re-gaining plant areas on top of the structures which had destroyed them, in other words greening rooftops (Tokaç, 2009). It absorbs a great portion of the water by taking rainwater under control. It contributes to the water management of the city through versatile use of the plant layer. Thus, investing in green systems becomes highly effective in terms of sewage systems and water purifying systems (Luckett, 2009). The first roof garden in history built for aesthetical purposes and lacking functionality has been found in sanctuaries and Ziggurat at Ur city of the antique Sumerians which was founded in 2000 B.C. (Osmundson,1999). Later in the 18th century, it has emerged at cold climate regions especially in Northern Europa where people covered their roofs in order to provide heat insulation and planting with herbaceous plants in order to fix the soil (Getter & Rowe, 2006).

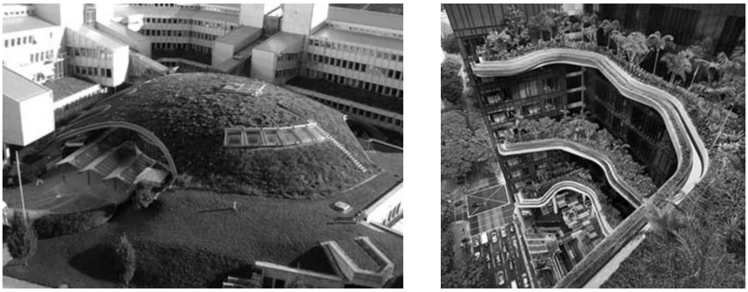

Figure 1. Green roofs (URL.1; URL.2)

Green roofs are described as a biological environment while they directly host vegetation (Yeang, 2006). Green roofs contribute to their environment by decreasing the urban warm island effect, controlling environmental waste water and improving ecological characteristics. In addition to the functional characteristics of green roofs, they create positive effects by offering diversity in terms of human health and recreation (Liu, 2004). The plant covering on green roofs improves the bioclimatic conditions protecting the roof and external facade of the building against outer effects (Aklanoğlu, 2009).

Rain gardens

Rain gardens, in other words 'biological collection areas' are pits which are formed through directing the rainwater without being processed. Rain gardens decrease the flow of water by collecting rainwater underground after absorbing it from roofs, roads, car parks (Demir, 2012). In urban areas, the entire surface is covered with rainwater through directing the water coming from the surrounding area to the rain garden (Figure 2). At the rain garden, water level increases as a result of surface flow and the addition of surrounding water and ponding occurs. Ponding varies according to the intensity of the rain, the capacity of the water to infiltrate into the surface, plant cover and the structure of the rain garden. Later, the ponding water slowly soaks into the soil from the surface of the rain garden (Doğangönül & Doğangönül, 2008) (Figure 3). Rain gardens were first used in public landscape planning and design by Maryland Environmental Protection Department through the bio-retention concept at Prince George, Maryland, USA in the 1980s. Afterwards, this idea improved and currently it is often preferred at house gardens, modern buildings and park areas (Sert, 2012).

Rain gardens are first perceived at urban areas as ordinary plant groupings. But in fact, they have many benefits functionally and aesthetically;

- Prevents the risk of flooding by decreasing the surface flow of the rainwater

(Katsifarakis, Vafeiadis & Theodossiou, 2015).

- Creates positive outcomes in terms of ecology by feeding the underground water (Church, S.P., 2014).
- Thanks to the natural layers of soil, rain gardens infiltrate the water and send it into the ground water through roots and increases the durability of the soil (Demir, 2012).
- Rain gardens provide biodiversity by creating a biological environment for living creatures (Beatley, 2011).
- It provides the feeding of the groundwater after the rain by reducing the amount of surface water flow. It provides homeowners, municipalities and other public spaces an extremely simple and cost effective rainwater management (Jaber, Woodson, LaChance, & York, 2007).
- Especially in urban areas and areas where impervious surfaces are dense, providing solutions to the drainage problems (Doğangönül & Doğangönül, 2008).
- According to Kathleen Wolf in the scope of the concept of ‘civic nature’, it has potential benefits on human health as a solution to the problem of sustainable infrastructure (Wolf, 2010).
- It helps the cleaning of contaminants carried as a result of surface flow and increases the quality of water (Demir, 2012).
- By carrying the water in the soil, above the level of underground, increases the green water levels in aquatic ecosystems and increases soil moisture (Kinkade-Levario, 2007).

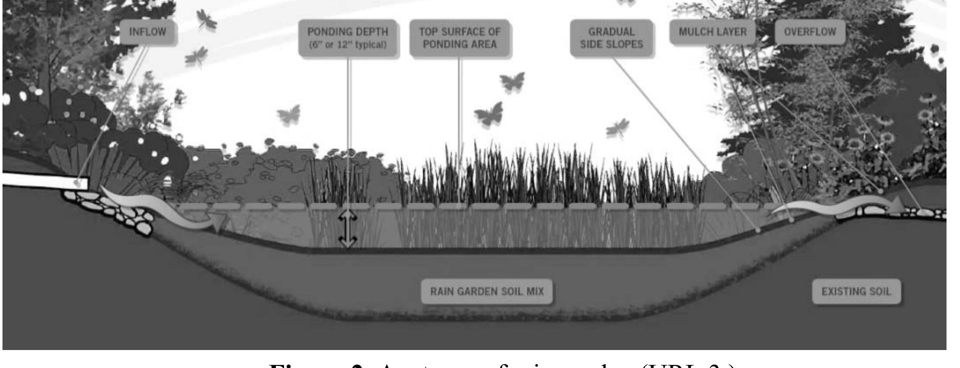

Figure 2. Anatomy of rain garden (URL 3.)

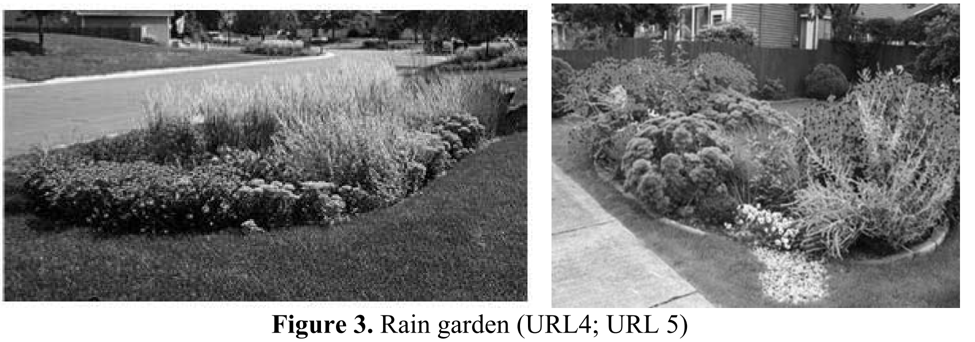

Figure 3. Rain garden (URL4; URL 5)

Rain garden location

There were 3 main steps to design a rain garden; i) creating geometric spaces to collect water, ii) positioning these spaces close to the hard floor coating, iii) when selecting and choosing materials and plant groups ,using the ones which require the minimum use of chemicals (Sert, 2012). While rain garden, usually residential gardens, can be implemented at green way networks, along the edges of vehicle and pedestrian ways and urban park areas, they also find a place at wide large-scale areas. Although the dimension at application areas are not fixed, they do not usually spread out to larger fields than planned because they are planned according to their current position (Selbig & Balster, 2010). Before making a rain garden in an area, it is necessary to examine especially the rainfall and climate structure closely. If the soil texture is clayey at the area, since the infiltration will be slow, a rain garden at larger sizes should be set up compared to a field with sandy or silty soil. Therefore, it is quite important to carry out an analysis of soil contexture analysis at the application field, to determine the infiltration rate of the soil, and to test in terms of permeability. Rain gardens are positioned on the areas which had been at lower elevation or had always accommodated water and which have low infiltration rates. Instead of flat fields, soil dug out of the pit, which is more inclined and allows more comfortable flow of water can be used at the bottom part. It is not appropriate to carry out rain garden planning at places with high underground water level (Müftüoğlu & Perçin, 2015).

Plant selection

In rain gardens by considering a naturalistic planting approach, it is paid attention to the use of appropriate native plant types. Gardens in this form would lend itself to the desired outcome since it will be in harmony with both the habitat of the region and the biological structure. Water at shaded outdoor areas causes insufficient warming for the habitat. Tolerance of the plants must be high against the early spring melt as well (Demir, 2012). Rain gardens are divided into three territories different from each other; i.) upper level regions in terms of humidity level (plants; *Physocarpus opulifolius, Cornus amomum, Rosa palustris, Taxodium distichum, Salix nigra, Plantanus occidentalis*), ii) sloped and moderate regions in terms of moisture (plants; *Ilex glabra, eronicastrum virginicum, Acer rubrum, Eupatorium colestinum*), iii) low level regions in terms of moisture (plants; *Hypericum densiflorum, Cornus racemosa, Rhus aromatic, Hammamelis virginiana*) (URL, 3). When selecting a plant area in the first district, plants which are water-resistant, strong rooted and resistant to sudden drought. While selecting plants for the second region, since the area is semi-arid in terms of moisture, plants which are resistant to semi-arid conditions are selected. Drought-resistant plants are used at the third level of since the moisture in the region is the least (Müftüoğlu & Perçin, 2015).

While planting at the site, plantation site selection should be in a good arrangement in order to create a grid network. Especially for the base region, plants with a developed root structure should be selected (Doğangönül & Doğangönül, 2008). When selecting plants, especially in urban areas, not only the physical conditions but also the aesthetic properties of the plants have to be taken into account. Aesthetically, the plantation designs should be made by preferring fragrant plants, good-bodied shrubs and colorful blooming plants which take the attention of butterflies and birds.

Constructed wetlands

All areas which naturally or artificially host permanent or seasonal bodies of water, whether stagnant or flowing, sweet, bitter or salty are wetlands (URL, 6). In addition to providing erosion control through the protection of natural balance, unloading of ground water, preventing wind, controlling flood, providing balance of climate at coastal areas, transfer of water, preventing the accumulation of water and toxic materials, and contributing to recreation and tourism these areas host various plant and animal species. Structured wetlands, on the other hand, remove surface water by creating permeable surfaces at a city part or within a rural area (Demir, 2012; Sert, 2012).

Rain tanks

They are areas where rain water is transferred to the collection site after descending from the roof or high structures by flowing through the graveled or planted area. These areas are systems which should be considered together with the purifying function of the plants by being detailed so that they do not form an obstacle at the surface. They are storage systems where the undrinkable water is stored in wooden, plastic or metal barrels or tanks for various uses located below or above the ground, at the garden or adjacent to the building or inside which should be considered together with the open canals which could transfer the water afterwards (Sert, 2012).

Landscape swales

Plant water arcs are areas which are used in order to collect and direct rainwater by slowing down the surface flow and progression of water. The performance is not only based on the length of the canal, but also they allow better infiltration by using obstacle sets which would slow down the flow. On the other hand, decreasing the watertight surfaces can decrease the volume of the rain flow to a great extent. Pervious surface and planted roofs are two methods that serve this purpose. Lawn canals or collapse areas are compliant to many different land conditions and can be adapted to design but their application costs are relatively low (Sert, 2012).

CONCLUSION

Cities experience interventions and changes as a result of changes in life conditions in the living environment of the people. This change affects the harmony of the natural processes and natural environment negatively. The changes which happen within the process cause the ecological balance to be damaged and the functionality of the nature to be spoilt. The damage of the ecological balance and the abuse of technology that it brings along have started to create a threat to the earth.

While urban areas develop with technology and industrialism, they bring along negative effects. The most important of these are the natural events which are not under the control of humans. Sudden and impromptu climate changes create natural disasters at cities which are not planned according to these conditions. For this reason, the living spaces should be planned according to a planning approach which evaluates climate data for the future years and the climatic changes. Planning which is going to be carried out according to climatization systems and strategies should follow strategies in harmony with natural environment and elements when needed. Because climate and social structure are factors which have the most important effect in the natural processes within the planning phase.

Recently changes are being experienced in water cycle at cities with the climate change felt through global warming. Faster evaporation through sudden temperature rises, drought with increasing temperatures and shallow streams through sudden rainfall is observed. Especially, the decrease in green areas, these climate changes cannot be tolerated and causes natural disasters.

Water is natural element that should be considered with caution in the water by taking the city. In urban areas, storage, preservation, has a vital impact that contains the functionality to use purifying again. In this context, sustainable natural and structural elements by combining new ideas for creating infrastructure in urban landscape can form as a result of the interaction between different disciplines.

In the recent years, nature has come back on the agenda with ecological approaches and the planning and design of living environments which are in harmony with the nature friendly formations has become a must. By considering the relationship between nature and planning, the amount of green areas should be increased and green infrastructure systems should be created. With the climate change and excess of rainwater with sudden rain, the urban infrastructure becomes inadequate, thereby; the water causes surface flow and floods. This situation has brought about the need for new holistic and sustainable approaches in planning the underground water structure. These approaches are called rainwater structure and are being applied through different approaches.

In the scope of sustainable rain water management the natural and structural elements should be considered together and new expansions should be made in order to create infrastructure landscapes at urban and regional forms. In order to create healthy and livable cities, landscape design principles which are directed towards creating natural and functional green infrastructure systems should be determined.

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Chapter 47

The Influence of Natural Flora on Landscaping: The Case of Uçmakdere (Tekirdag)

Burcin EKICI*

INTRODUCTION

In our day, although the technologies which are developed to increase people's life comfort, industrialization, and urbanization make daily life easier, they also keep people apart from nature and natural life. However, the balancing and relaxing influence of natural environment is necessary for people's psychological and physical renewal. Therefore, especially in recent years, the demand on rural areas with natural characteristics, that are necessary to meet the recreation needs, has increased.

Rural areas endeavor to respond the recreation needs of the townsman with their natural structure and resources such as fresh air, relaxing effect, wild life, vegetation potential, and landscape (Khabbazi & Yazgan, 2012). Although the ratio of the rural areas used for recreational purposes in European countries is 2%, in our country it is only around 0.01% (Türker, Öztürk, Pak & Durusoy et al, 2002). However, throughout the history it has always been a fact that human being receives several psychological and physiological health benefits by communing with nature (Özgüner, 2004). The studies have shown that the human being can receive considerable benefits even by only having a passive relation with nature, based on visuality (Ulrich & Addoms, 1981). It is determined that especially spending time in woods lowers the stress level and green plants make a relaxing and tranquilizing influence by regulating the blood pressure, heart rhythm and respiration (Abbott, 1996). Besides, the fact that many favored touristic places are of natural areas, is one of the most important evidence putting forward the importance of these areas to people (Kaplan, 1992).

Specifications of the natural environment play a significant role in their perception and the exposure of their uniqueness (Skrivanova & Kalivoda, 2010). Therefore, at the present time when the tendency to these areas soars, it is required to define the natural resources in order to enable sustainable utilization of nature and to obtain an integrative conservation- utilization balance in planning. The existence of flora, which is one of the most important components of landscaping, increases the visual quality of the area (Arriaza, Ortega, Medueno & Aviles, 2004). Plants are significant not only because of their visual and ecological specifications but also because of the influences these specifications have on people. For this reason, while examining the natural resources, first of all the flora existence that forms the main character of the area must be defined and then its contribution to the area must be determined.

This study is made to determine the floristic data which contributes the visual landscape of Ucmakdere road located in the southwest of Tekirdag. The province of

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Tekirdag is quite unsatisfying in terms of open and green areas (the ratio of green areas is approximately 0.5%) and the number of alternatives around where people can make is extremely limited (Özyavuz & Şişman, 2014). The area's being an alternative rural recreation opportunity in the country side, is one of the most important reasons for its selection as the subject of this study.

Ucmakdere, located on the coast of Marmara and the piedmont of Ganos Mountains, has habitat diversity and tourism alternatives. People's interest in natural environments and the activities in there, also bring the need for aesthetical value. Ucmakdere, the subject of this research, with its rugged topography and the different habitats it includes such as coast, river, mountain, and valley, rugged topography, is quite a rich land in terms of natural and visual resources. Consequently, several researches are made in the area and its neighborhood in order to reveal this rich potential. Yarcı (2000) and Çoban (2004) researched the vegetation of Ganos Mountains and Kantarcı (1976) researched the forest communities and their habitat specifications in the Thrace region. A. Özyavuz (2011) analyzed the opportunities to use natural plants of Kumbag- Sarkoy coastline in landscape architecture, whereas M. Özyavuz (2011) made the ecological analysis of the vegetation of Ganos Mountains using Geographical Information Systems. Şişman & Genç (2012) analyzed the natural and cultural specifications of Ucmakdere village in regard to eco- tourism and Özşahin (2015) analyzed the ecogeomorphological specifications of the Ganos Mountains. Whereas Kiper, Korkut & Yılmaz (2011) put forth the natural landscaping specifications of Sarkoy district and evaluated the effects of these specifications on rural tourism. Among these studies, there is no research area oriented direct floristic research. However, Ucmakdere is very rich in terms of habitat diversity, flora, and plant species variety. The visually striking plants along the Ucmakdere motorway route are identified and then evaluated in regard to form, leaf, flower, fruit aesthetic, scent, and seasonal condition. In this way, the research area will be evaluated in terms of vegetal potential, its presentation will be made within the scope of nature conservation awareness, and sustainable use will be provided with natural and cultural landscaping values. Thus, it is aimed to bring in areas to Tekirdag province, which is insufficient in terms of open and green areas, meeting the needs of people in the sense of function and aesthetics.

MATERIALS AND METHODS

The research material consists of several natural plants located in Ucmakdere (Tekirdag). Ucmakdere road, which is approximately 53 km long, and its neighborhood are selected as research area. This area is preferred as it is located on the route to Tekirdag city center and a tourism center Sarkoy, as there are observation points at different altitudes, and as it has natural landscape characteristics.

Tekirdag, located in the northwest of Turkey, became a metropolis in 2012 and it is one of the coastal towns of Turkey in which natural and cultural landscape destruction is very common because of structureless usage of the land (Korkut, Şişman, Yetim & Özyavuz., 2008). The research area of our study, Ucmakdere, is among the rare places in Tekirdag with no ecological destruction and is located between the Tekirdag city center and Sarkoy district, on the extensions of Ganos Mountains.

Climatic characteristics have a determining role on the flora which forms the material of this study. Although sub-humid Marmara climate dominates the area, when moved upwards a more humid climate is seen compared to the waterfront (Özşahin, 2015). Therefore, the examined area is within the European- Siberian (Euxine) and Mediterranean flora zones in terms of natural vegetation (Dönmez, Aydınözü, Büyükoğlan & İbret, 2012). In the area along the coastline, the elements of maquis formation (*Phillyrea latifolia*, *Quercus coccifera*, *Pistacia terebinthus*, *Olea oleaster*, *Cerci*s *siliquastrum*, *Spartium junceum* and *Juniperus oxycedrus*) can be seen up to 350- 400 m height. In higher altitudes, this vegetation is replaced by humid forest vegetation. Humid forests are usually mixed forests and their dominant plant is *Quercus petraea* (Özyavuz, 2011; Aydınözü, 2008). The influence of the mild climate can be seen especially throughout the valleys and this effects the combination of forest communities (Kantarcı, 1976).

The research method consists of three parts: literature review, area survey, and analysis- evaluation. In the first part consists of the literature collection regarding the aim of the study and the area, then necessary evaluations are made.

The onsite area studies are made between 2014- 2015 at different time periods and seasons. Within this framework, the naturally spread plants with striking views are identified and photographed and samples are taken in order to create herbarium material. Moreover, area sights are conducted and the points to be conserved and developed in terms of landscaping, risky areas requiring precautions and renovations are determined and the coordinates of these points are taken with GPS.

Collected plant samples are dried according to herbarium techniques and prepared for diagnosis. In the identification of plants, grounding mainly on the 11 volume book including Davis (1965- 1985), Davis, Mill & Tan (1988), and Güner, Özhatay, Ekim & Başer, (2000) and the studies of Yaltırık & Efe (1996), Kaya & Başaran (2006), Vermeulen (1997), Tekin (2005), Özhatay N., Özhatay E. & Erdem (2010), and Eminağaoğlu (2012) are also referred.

In the last part, the plants are evaluated in terms of the visual contributions they make to the landscape regarding the obtained data and the time period which they take utmost attraction is determined. Besides, the state of the area is put down to the fact from the point of risks and opportunities and solutions are offered for the road and the neighborhood.

RESULTS

Ucmakdere, located on the Marmara Sea and the extensions of Ganos Mountains, offers different landscape characteristics with its moving topography and natural (mountain, river, coast, and forest landscape) and cultural characteristics (rural landscape) and is preferred by the people for recreational purposes. The typical natural plant communities are the most important factors which pull people to this area. Especially the motorway route provides many opportunities in terms of visual landscape.

The natural vegetation and the seasonal colour alterations they create increase the landscape value of the area. Therefore the vegetation, which enriches the natural specifications, are examined within the scope of the study and it is determined that 11 woody and 57 herbaceous plants have visual impact by different vegetative parts (Table 1, Figure 1). The identified plants mostly (15 species) belong to the *Asteraceae* (22.1%) family, followed by *Lamiaceae* (10.3%), *Fabaceae* (7.4%), *Euphorbiaceae* (4.4%), and *Papaveraceae* (4.4%) families respectively. When these plants are evaluated according to their visual impressive, it is determined that their flowers (89.7%) have aesthetical value in particular.

Table 1. The plants identified in the research area and their visual impacts on the landscape.

Latin name	Family	Visual impact
Woody plants		
Phillyrea latifolia L.	*Apocynaceae*	Leaves (impact of scenery)
Carpinus orientalis Miller	*Betulaceae*	Fall foliage
Cistus creticus L.	*Cistaceae*	Flower
Cistus salviifolius L.	*Cistaceae*	Flower
Juniperus oxycedrus L. ssp. *oxycedrus*	*Cupressaceae*	Leaves (impact of scenery)
Elaeagnus angustifolia L.	*Elaeagnaceae*	Leaves (impact of scenery)
Cercis siliquastrum L.	*Fabaceae*	Flower
Spartium junceum L.	*Fabaceae*	Flower
Platanus orientalis L.	*Platanaceae*	Form
Paliurus spina- christi Miller	*Rhamnaceae*	Flower and fruit
Rosa canina L.	*Rosaceae*	Flower and fruit
Herbaceous plants		
Alisma plantago- aquatica L.	*Alismataceae*	Form and flower
Ferula communis L.	*Apiaceae*	Flower
Dracunculus vulgaris Schott	*Araceae*	Flower
Achillea coarctata Poir.	*Asteraceae*	Flower
Anthemis cretica L. subsp. pontica (Willd.) Grierson	*Asteraceae*	Flower
Anthemis tinctoria L. var. *tinctoria*	*Asteraceae*	Flower
Centaurea cyanus L.	*Asteraceae*	Flower
C. diffusa Lam.	*Asteraceae*	Flower
C. solstitialis L. ssp. *solstitialis*	*Asteraceae*	Flower
Cichorium intybus L.	*Asteraceae*	Flower
Crepis foetida L.	*Asteraceae*	Flower
Crepis vesicaria L.	*Asteraceae*	Flower
Crupina vulgaris Cass.	*Asteraceae*	Flower
Inula ensifolia L.	*Asteraceae*	Flower
Jurinea consanguinea DC	*Asteraceae*	Flower
Pallenis spinosa (L.) Cass.	*Asteraceae*	Flower
Scolymus hispanicus L.	*Asteraceae*	Flower
Tragopogon porrifolius L.	*Asteraceae*	Flower
Anchusa azurea Miller var. *azurea*	*Boraginaceae*	Flower
Echium italicum L.	*Boraginaceae*	Flower
Rapistrum rugosum (L.) All.	*Brassicaceae*	Flower
Sambucus ebulus L.	*Caprifoliaceae*	Flower
Dianthus calocephalus Boiss.	*Caryophyllaceae*	Flower
Dianthus sp.	*Caryophyllaceae*	Flower
Moenchia mantica (L.) Bartl.	*Caryophyllaceae*	Flower

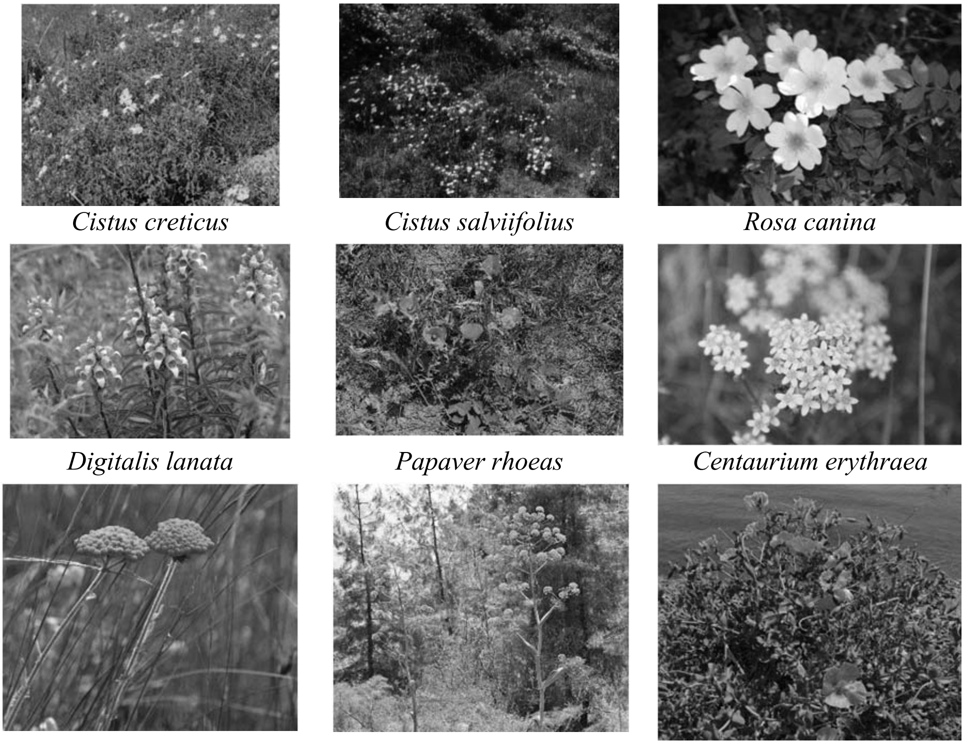
Calystegia sepium (L.) R. Br.	*Convolvulaceae*	Flower
Convolvulus elegantissimus Miller	*Convolvulaceae*	Flower
Scabiosa atropurpurea L. subsp. *maritima* (L.) Arc	*Dipsacaceae*	Flower
Dorycnium graecum (L.) Ser.	*Fabaceae*	Flower
Psorolea bituminosa L.	*Fabaceae*	Flower
Trifolium pretense L.	*Fabaceae*	Flower
Euphorbia amygdaloides L.	*Euphorbiaceae*	Flower
E. helioscopia L.	*Euphorbiaceae*	Flower
E. seguieriana Necker subsp. *niciciana* (Borbás ex Novák) Rech.	*Euphorbiaceae*	Flower
Centaurium erythraea Rafn subsp. *turcicum* (Velen.) Melderis	*Gentianaceae*	Flower
Geranium lucidum L.	*Geraniaceae*	Flower
Hypericum perforatum L.	*Hypericaceae*	Flower
Origanum vulgare L. subsp. *vulgare*	*Lamiaceae*	Flower
Salvia virgata Jacq.	*Lamiaceae*	Flower
Stachys cretica L. subsp. *bulgarica* Rech.	*Lamiaceae*	Flower and leaves (impact of scenery)
Teucrium polium L.	*Lamiaceae*	Leaves (impact of scenery)
Teucrium chamaedrys ssp. *chamaedrys*	*Lamiaceae*	Flower
Thymbra spicata L. var. *spicata*	*Lamiaceae*	Flower
Thymus zygioides Griseb.	*Lamiaceae*	Flower
Asparagus acutifolius L.	*Liliaceae*	Form
Glaucium flavum Crantz	*Papaveraceae*	Flower
Papaver dubium L.	*Papaveraceae*	Flower
P. rhoeas L.	*Papaveraceae*	Flower
Lysimachia atropurpurea L.	*Primulaceae*	Flower
Anagallis arvensis L.	*Primulaceae*	Flower
Clematis vitalba L.	*Ranunculaceae*	Flower
Ranunculus neapolitanus Ten.	*Ranunculaceae*	Flower
Lythrum salicaria L.	*Rosaceae*	Flower
Galium odoratum (L.) Scop.	*Rubiaceae*	Flower
Galium verum L. ssp. *verum*	*Rubiaceae*	Flower
Digitalis lanata Ehrh.	*Scrophulariaceae*	Flower
Solanum nigrum L.	*Solanaceae*	Flower and fruit

Colour, one of the most effective factors on visual perception, is the first element affecting the senses (Altınçekiç, 2000). The surprising effect of the flora and the flower colour and blossoming time of the plants are explained, which are identified in order to put forth the relationship between the people and the landscape (Table 2). Accordingly, the colour show which takes place between February and November and varies seasonally, breathes a new life into the landscape. In several areas, it is accompanied by fragrance and the aromatic scent of *Elaeagnus angustifolia* and the members of *Lamiaceae families.*

Table 2. The flower color and blossoming time of the plants identified in the research area.

Latin name	Blossoming time (months)												Flower colour
	1	2	3	4	5	6	7	8	9	10	11	12	
Woody plants													
Phillyrea latifolia					■								Greenish white
Carpinus orientalis							■	■					Green
Cistus creticus			■	■	■	■							Pink
Cistus salviifolius			■	■	■								Yellow
Juniperus oxycedrus ssp. *oxycedrus*													
Elaeagnus angustifolia				■	■	■							Yellow
Cercis siliquastrum				■	■								Pink
Spartium junceum				■	■	■	■						Yellow
Platanus orientalis			■	■	■								
Paliurus spina-christi					■	■	■						Yellow
Rosa canina					■	■	■						Pink, white
Herbaceous plants													
Alisma plantago-aquatica						■	■	■	■				White
Ferula communis				■	■	■							Yellow
Dracunculus vulgaris					■	■							Purple
Achillea coarctata					■	■	■						Yellow
Anthemis cretica subsp. *pontica*				■	■	■	■						White
Anthemis tinctoria var. *tinctoria*					■	■	■	■	■				Yellow
Centaurea cyanus				■	■	■							Bluish- purple
C. diffusa							■	■					White
C. solstitialis ssp. *solstitialis*						■	■	■					Yellow
Cichorium intybus				■	■	■	■	■	■				Lilac
Crepis foetida					■	■	■	■	■	■			Yellow
Crepis vesicaria				■	■	■							Yellow
Crupina vulgaris					■	■	■						Pink
Inula ensifolia						■	■	■					Yellow
Jurinea consanguinea					■	■	■	■					Pink- purple
Pallenis spinosa				■	■	■	■	■					Yellow
Scolymus hispanicus						■	■	■	■				Yellow
Tragopogon porrifolius				■	■	■							Pink
Anchusa azurea var. *azurea*				■	■	■	■						Purple
Echium italicum					■	■	■	■					White
Rapistrum rugosum				■	■	■							Yellow
Sambucus ebulus							■	■					White
Dianthus calocephalus					■	■	■	■	■				Pink
Dianthus sp.				■	■	■	■						Pink

Moenchia mantica			■	■	■	■							Lilac
Calystegia sepium					■	■	■	■	■				White
Convolvulus elegantissimus				■	■	■							Pink
Scabiosa atropurpurea subsp. *maritima*					■	■	■	■	■	■			Pink - lilac
Dorycnium graecum				■	■	■	■	■					White
Psorolea bituminosa					■	■	■	■					Purple
Trifolium pratense					■	■	■	■	■				Pink
Euphorbia amygdaloides			■	■	■	■	■	■					Greenish yellow
E. helioscopia		■	■	■	■	■							Greenish yellow
E. seguieriana subsp. *niciciana*			■	■	■	■	■	■	■	■			Greenish yellow
Centaurium erythraea subsp. *turcicum*					■	■	■						Pink
Geranium lucidum			■	■	■								Pink
Hypericum perforatum				■	■	■	■	■					Yellow
Origanum vulgare subsp. *vulgare*					■	■	■	■	■	■			Pink
Salvia virgata					■	■	■	■	■				Lilac- purple
Stachys cretica subsp. *bulgarica*					■	■	■	■					Pink
Teucrium polium						■	■	■	■				
Teucrium chamaedrys ssp. *chamaedrys*						■	■	■	■				Pink
Thymbra spicata var. *spicata*						■	■						Pink
Thymus zygioides				■	■	■							Pink
Asparagus acutifolius								■	■				Yellow
Glaucium flavum					■	■	■						Yellow
Papaver dubium				■	■	■							Red
P. rhoeas			■	■	■	■	■	■					Red
Lysimachia atropurpurea					■	■	■	■	■	■			Purple
Anagallis arvensis				■	■	■	■	■	■				Purple
Clematis vitalba						■	■	■					White
Ranunculus neapolitanus					■	■							Yellow
Lythrum salicaria						■	■	■					Pink
Galium odoratum					■	■	■	■					White
Galium verum ssp. *verum*						■	■	■	■				Yellow
Digitalis lanata					■	■							Whitish- brown veiny
Solanum nigrum						■	■	■	■	■	■		White



Cistus creticus *Cistus salviifolius* *Rosa canina*

Digitalis lanata *Papaver rhoeas* *Centaurium erythraea*

Achillea coarctata *Ferula communis* *Glacium flavum*

Figure 1. The plants identified in the research area.

DISCUSSION AND CONCLUSIONS

Natural vegetation is one of the key components of landscaping. Therefore, identifying the floristic specifications is very important to define the area and find out its characteristics. In this study, the natural vegetation of Ucmakdere motorway route is examined and the plants which make contribution to the landscape are defined.

The open and green areas of Tekirdag province are insufficient and do not meet the recreation needs of the community (Yılmaz, 2006). The aim of this study is to explain the data regarding the natural resources of the area and, thus, enhancing the alternatives of nature tourism, since the aesthetical views of plants in different seasons create an important recreation source for nature lovers and amateur photographers. In the light of this information, it is recommended to create botanic maps showing the routes with rich flora and to plan the trekking routes accordingly. During the research, it is determined that 68 natural plants are visually striking. Considering the uniform plant types used in urban landscaping, the use of these alternate plants in the city centers becomes even more important. The plant and maintenance cost of natural plant usage is low and they are highly adaptable, which is very important in terms of providing habitat to birds and the fauna (Breuste, 2004). The studies have shown that people's meeting wild animals in the cities, prompts them to use these areas more (Dick & Hendee 1986). For this reason, the identified plants must be cultivated and production studies must conducted and the use of appropriate species in urban landscaping must be popularized. This will support ecological landscape planning.

Ucmakdere road, enabling a high quality view, different habitats, and flora, also has dangerous bends. The structural and vegetative precautions taken in this area is quite unsatisfying. Moreover, because of the excavated embankment along the road, endanger the traffic with risk of landslide. Safety adjustments must be made and necessary precautions must be taken accordingly.

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Chapter 48

Topography, Hybridization and Deconstructivism Effects on New Typologies in Landscape Design

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INTRODUCTION

Although seeking innovations in design always exists, it is sometimes seen that some designs that rise in certain periods are not different from the former ones and it is also clear that new designs and solutions cannot always be achieved.

According to the glossary issued by Turkish Language Association, lexically the word "New" means not old, recently born, built, or created, not used by anyone else previously. Besides this description, innovations rising as a result of the curiosity of human against novelty affects developments in any field.

Designers have revealed a novelty through interdisciplinary applications and new approaches that have developed in recent years and become increasingly important in design.

With technology, rural-urban migration has increased in number and to solve the accommodation problem in urban areas large areas have turned into concrete blocks; the number of the factories and autos have also increased. Dams and roads have been constructed and forests have been destroyed due to various reasons. As a result, interference in nature has reached such a dangerous level that now it threatens human life. Nature, which used to have the power of self-regeneration and self-reformation during the times when human factor had not been so effective as today, lost its regeneration power day by day as a result of the idea that human has the right of exploiting the nature in line with its own interests and due to harmful practices for the nature and consequently it started to fail in providing human with the necessary environment to live. For innovative designs that reject negative intervention to the nature and aim environmental compliance it is necessary to consider infrastructure, landscape and architecture together and the designs should be created by giving particular importance to ecology (URL 1).

In this study, the following questions have been researched: "What do the approaches put forward as innovations; how did they rise and who were their pioneers?"

The development of the term "new"; the topographies which are active in creation of new typologies; hybridization and deconstructivism have been analyzed and the samples of new typologies have been evaluated.

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MATERIALS AND METHODS

The main material of the study is concept of hybridization, topography and deconstructivism. In this context, materials include theoretical foundations of materials, Turkish and foreign literature concerned with method and results.

RESULTS

New Typologies

As a result of the rapid depletion of natural structure, the designers create new typologies with the aim of establishing new methodologies in design. Ecological awareness and discoveries have particular importance in the formation of new typologies.

Typology is the name of the study carried out to classify objects according to their physical or other characteristics. In other words, it can be defined as researching the possibility of integration of all elements in order to classify the elements that form the design or the creation of archives on the characteristics of each element. The term of typology is necessary in design for formation of a point of view that may help for a better understanding of the relationship between the objects rather than simply classifying them.

Continuity, fluidity and hybridization (the approach through which infrastructure, landscape and architectural problems are solved at a time) should be considered while designing the form within the methodology which is necessary for the formation of new typologies. The differences in topographical structure and climatic data are the most important factors for these systems (Gausa, 1997).

The Term "Topography" and Its Relation with New Typologies

Topography is the art or practice of graphic delineation in detail usually on maps or charts of natural and man-made features of a place or region especially in a way to show their relative positions and elevations. Topography is an important starting point for the spatial development opportunities of the urban planning area. Natural and cultural processes and suitability limits of the practices should also be determined by topography.

Today, time and space feelings are being lost because identical buildings are being constructed anywhere in the world. This unfavourable situation leads the designers to the efforts to improve the relation between the topography and the other elements surrounding the topography. Topographic structure is effective in the formation of spaces. Topographic structure affects the entire settlement. If a sloping topography is in question, then settlement should conform to the slope and should be established as integrated into the topography.

In the event that the design of the new topologies stands as an extension of the topography, natural structural differences and diversity of geographic data shall make the design genuine and localize it. All spaces are being transformed into places where the topography is effectively used and do not have a single characteristic in a flexible manner and an active system that is able to grow and change. In new typologies, primary goal is to maintain in architecture what nature has designed and establish a methodology for this purpose.

The way of using topography correctly and avoiding destruction is understanding the relationship between the form and the function. Through a good data collection process for the terrain, one can understand which characteristics shape the design at what level. In this context, the first thing to be done is to collect information about the topographical structure. What forms the landscape characteristics at what level can be understood easily with a well organised data collection process for the terrain. Within this scope the first step to be taken should be data collection about the terrain.

The first studies within this context are called land art (Figure 1) which means studying directly the nature and fulfilling edaphic works. These studies were carried out in the 19th century and supported the idea of integration to the nature. A group of artists who are aware of the negative intervention to nature, carried out some kind of artistic activities by using materials that can only be obtained from nature in order to share their awareness with the people and draw their attention again on nature and founded the art called “land art”. These mentioned works were created by American artists such as Michael Heizer, Robert Smithson, Robert Morris and Walter De Maria (Krauss, 1986).

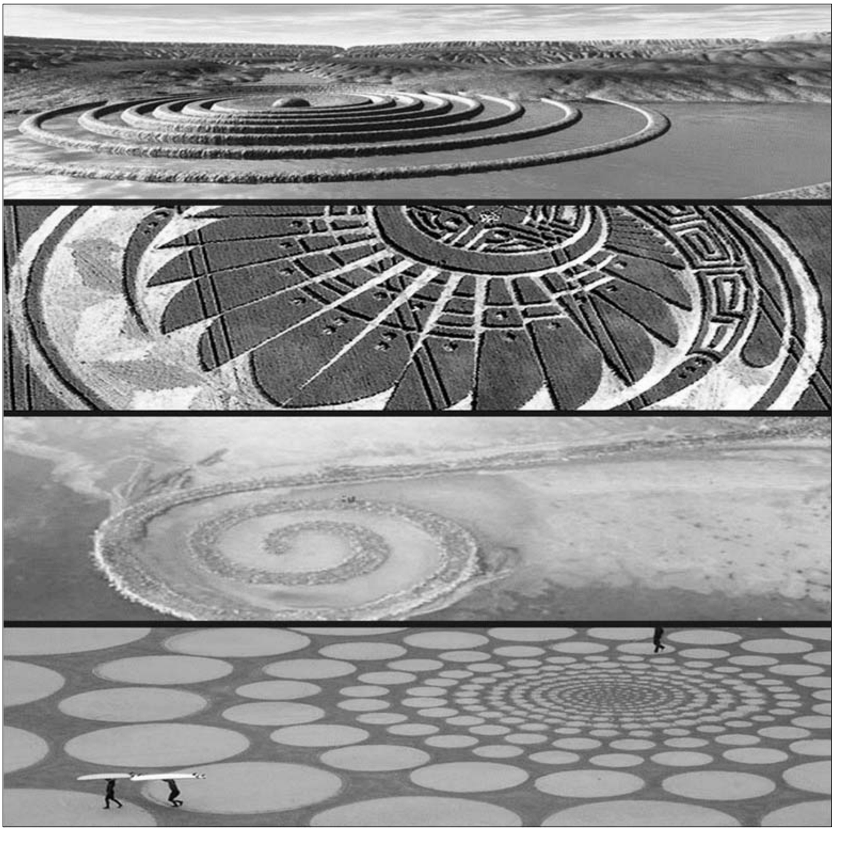

Figure 1: Samples of Land Art (URL- 1)

The Term “Hybridization” and Its Relations with New Typologies

Hybridization means the use of different systems within a single structure. It is possible to create mixed designs by making contact with designers who design spaces using different systems. With this hybrid design, complex shaped hybrid spaces that exceed those developed up to the present started to exist. Hybrid structures are the ones that go far beyond the classic examples, with technical and stylistic differences. These structures allow a new kind of spatial formation.

The term “Hybridization” are defined as remarkable monumental structures among other uniformed textures. They are considered as establishing contact with old formed textures through contrasts. On the other hand, “uniformed old textures” still continue to be created by “conventional” building bylaws and planning decisions and develop in blocks of equal height. During the practice of an architectural project, the context of space and time texture created by the settlement should be considered as important as the simplicity and consistency of the projects own internal philosophy. The opportunity of maintaining the texture of the settlement in terms of space and time on new structures is possible with hybridization. Thus, new spaces that make the formerly created spatial texture more complicated by maintaining it instead of just opposing the old texture. The habit of creating spaces that come from the past and the way of using time that becomes a pattern can be enhanced. Continuity of spatial and temporal development of the texture may be protected by supporting the envisaged layout on the settlement plan (Acar, 2006). Integration of systems enables a kind of settlement style be established and richer living environments be created without imitating the past. To be considered as “good” any urban environment should consist of the combination of planning of all the systems that constitute the environment.

The Term “Deconstructivism” and Its Relation with New Typologies

Deconstructivism is a movement that emerged in the late 1980s and is based on the methods such as fragmenting the integrity of the architectural elements that make up the structure of a building, manipulating a structure's surface, distorting and dislocating architectural elements such as skin of a building using non-orthogonal and non-rectilinear shapes (URL 2). Deconstructivism not only lives on modern and postmodern thought and forms but also criticizes them. Mutual interaction of modernism and postmodernism has also been reference for the other 20th century movements such as expressionism, cubism, minimalism and contemporary art. The practitioners of Deconstructivism consider the principles” "form follows function", "purity of form," and "truth to materials” as constricting rules of modernism and attempt to move away from these terms. They criticize the functionalism and structural rationalism of Modernism and support the multiplicity of meanings in Postmodernism. Deconstructivists faithfully adopt subjectivity, creativity, originality, authenticity and transparent communication (Mc Leod, 1998).

The main objective of the new typologies is integrating the topography with the structures and designing the structures according to the land. Deconstructivism allows forms be in different formats which supports the form of the structures in new typologies.

Pioneers of New Typology and New Typology Samples

Pioneers of New Typology

There are three events that affect the rise of Deconstructivism. The first one is Parc de la Villette architectural design competition held in 1982. Especially designs by Jacques Derrida and Peter Eisenman'in and Bernard Tschumi’s award-winning design had important influence on Deconstructivism movement. The second important event is the Museum of Modern Art’s 1988 Deconstructivist Architecture exhibition in New York, organized by Philip Johnson and Mark Wigley. This exhibition is one of the landmark events both for Deconstructivism to come to public notice and for the emergence of the designers who will be associated with the movement in the future. Works of Frank Gehry, Daniel Libeskind, Rem Koolhaas, Peter Eisenman, Zaha Hadid, Coop Himmelb(l)au and Bernard Tschumi were exhibited at the Museum of Modern Art's 1988 Deconstructivist Architecture exhibition in New York. The term "Deconstructivism" has come to embrace a general trend and has found some place as a movement which is widely used as a result of the mentioned exhibition. The third event that has great contribution to the movement is opening of the Wexner Centre for the Arts in Columbus, Ohio, designed by Peter Eisenman, in 1989 (URL 2).

Deconstructivists were initially influenced by the ideas of French philosopher Jacques Derrida. The pioneers of Deconstructivism are greatly influenced by geometric imbalances and formal experiments of constructivism.

New Typology Samples

Yokohama International Port

It is among the spaces which are designed to look like the extension of the topography (Figure 2). Buildings, circulation area and functional requirements are formed by the topography. Integration between surface and static characteristics are provided. In this project, taking advantage of topography, stratification, otherness, uniqueness, non-intersection and continuity is created (Dinler, 2007). The designers call what they have created as "a system that provides continuity but is not monotonous". A design which is adaptable to the environment has been created by providing folded, twisty and flexible places that interpenetrate the other.

Figure 2. Yokohama International Port (URL 3)

Kansai-Kan Library

Kansai-Kan Library is one of the new typology samples with its area of 60.000 m2 (Figure 3). The design of the structure that offers controlled transparency, enables the working spaces and the areas open to visitors to benefit from daylight at maximum level and lead to the landscape by integrating into the topography. Ramps and stairs are both compatible with the topography and meet all the requirements. Continuity, fluidity and asymmetry have been aimed to be obtained (URL 4).

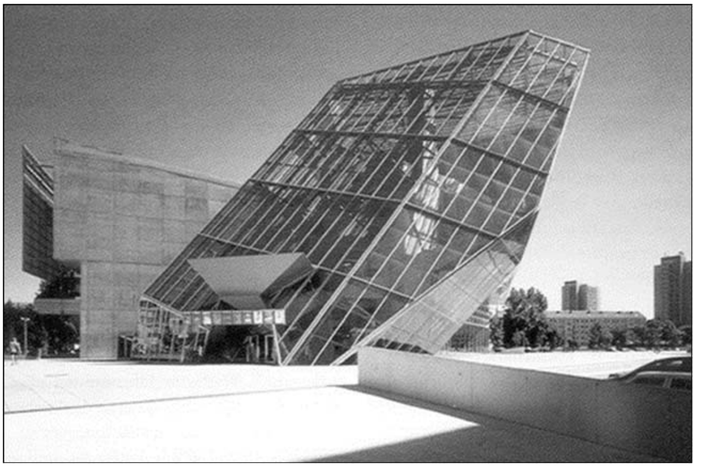

Figure 3. Kansai-Kan Library (URL-4).

Denmark Vilhelmsro Primary School

Canted roofs provide fluidity and continuity with the topography with their form that each roof seems to continue in the other one. Different slopes of the roofs enable daylight to easily reach every part of the school and the school is integrated with the sloping terrain and landscape (Fig. 4).

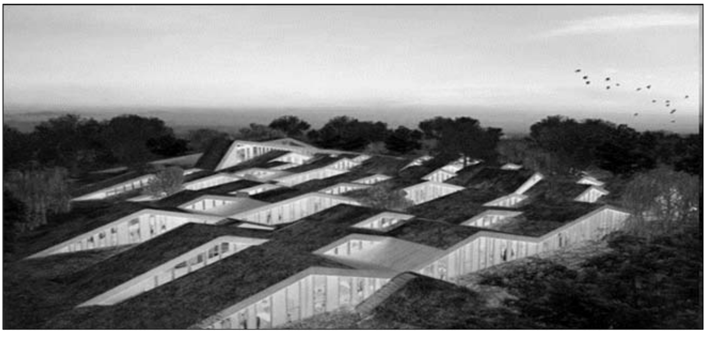

Figure 4. Denmark Vilhelmsro Primary School (URL-5)

Meydan Shopping Centre

The project designed by Foreign Office Architects, comprises a shopping center in Umraniye, Istanbul and the large green space that covers the center (Figure 5). Design, which is compatible with the topography is different from ordinary shopping centers with the structural geometry and circulation strategy. The central square supported with a great number of footpaths, the two roads passing through the roofs and linking the structure to the downtown and the adaptation of the roofs to the topography enhance the performance of the structure. One of the most important features of the shopping center is that daylight is benefited at maximum level (URL 6).

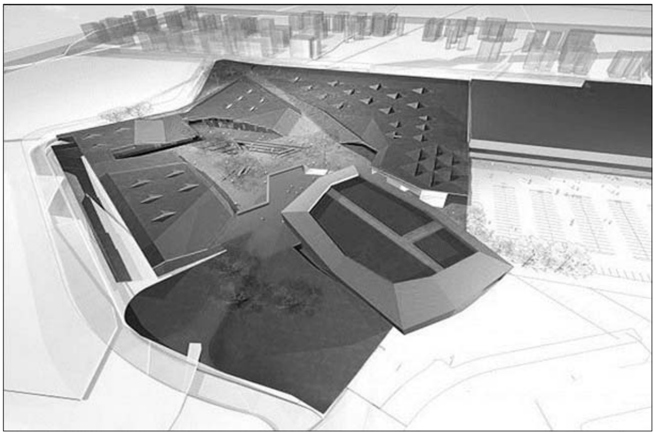

Figure 5. Meydan Shopping Centre (URL 6)

Latvian National Museum of Art

A design compatible with the topographic structure and combined with new features is devised to strengthen the sustainability without disturbing the historic characteristics of the building. The design links the building with a new park and a gallery. Integrating into the topography the gallery, park area and the ways constitute a good example for new typologies (Figure 6) (URL 7).

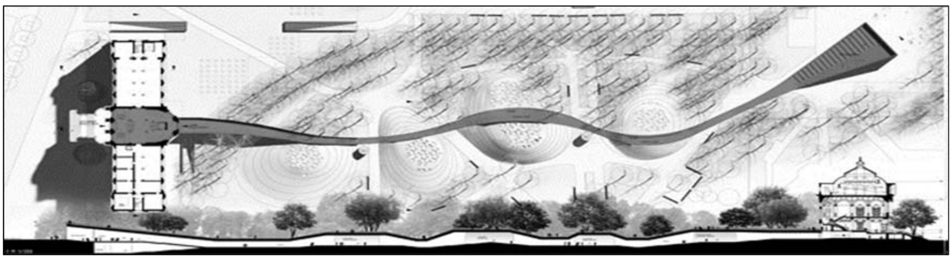

Figure 6. Latvian National Museum of Art (URL 7)

Jean Moulin High School, France

The high school located in Revin, France is equipped with green roofs and the building is integrated with the curved and organic structure of the land. The building disappears between the slopes and entirely consists of terraces (Figure 7). Each terrace practiced on the topographic structure forms a floor and high windows lead the natural daylight to inside (URL 8).

China International Horticultural Exhibition Complex

Flowing Gardens Project, located in China, is gradually becoming a place where a wide range of land is being renewed and horticulture is synthesized with technology with the integration of the combination of architecture and the terrain within sustainable and holistic vision. The system in the field operates as a network in which landscape, transportation and architecture integrate (Figure 8) (URL 9).

Figure 7. Jean Moulin High School (URL-8)

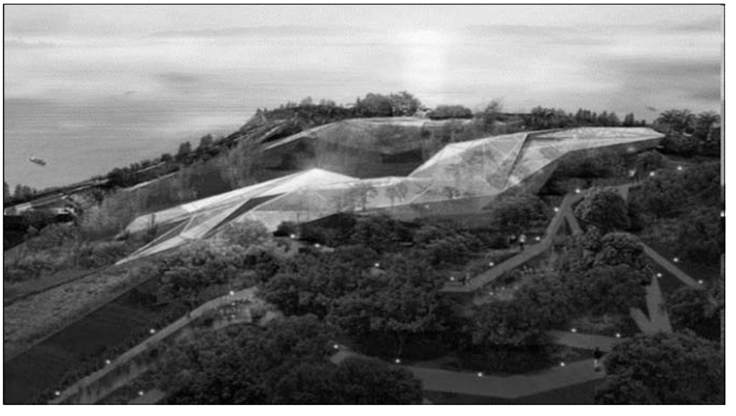

Figure 8. China International Horticultural Exhibition Complex (URL 9)

CONCLUSION

In the study, the term “innovation”, topographies that create new typologies, hybridization and the movement of deconstructivism, which became increasingly common in recent years, have been examined and the relationship between deconstructivism, modernism and postmodernism have been aimed to be set forth.

Nowadays the destruction of the environment and the rapid depletion of natural structures gradually increases and this situation forces human to unavoidably change his/her lifestyle. Transformation from consumption society where energy, sources and supplies are inconsiderately consumed to sustainable society should have particular importance. Great effort should be made in order to design new typologies widely so that a new lifestyle benefiting from renewable energy sources and damaging nature as little as possible can be comprised besides the term “sustainability”. Sustainable design practices, as in the examples, should be adopted as a reflection of the mentioned effort. The designs creating new typologies, ecological design, techniques that produce solutions to ecological problems and aesthetic should be brought together. Besides being aesthetic, the design should be able to reflect the local cultural character, belong the location where it exists and combine the systems forming the environment in order to be supported by technical and mechanical elements. Continuity of the energy used in places should be provided without causing environmental problems. Thus, both nature and settlement can be resumed together.

Consequently, it is necessary to establish ecological balance in spatial design and produce the technology to support its continuity and also promote its utilization as well. Managing energy use in the site properly, implementation of projects practicing the utilization of the systems that use renewable energy sources, making people change their thoughts by providing them with nature integrated and nature-friendly living spaces and thus creating new typology samples in converting cities should be other steps to be taken quickly.

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Chapter 49

Relations Between Precipitation and Forest Distribution in Turkey

Atilla ATİK*

INTRODUCTION

Forests are natural resources with the highest share in terrestrial ecosystems in terms of surface area and biomass with their invaluable services and functions like biological diversity, water production, cleaning the air, recreation, preventing erosion, education, protecting agriculture and residential areas as well as wood products and non-wood forest products provided by them for the society. Because of these extremely important services and functions they have or they provide, forests are nowadays considered at a global level rather than being assessed at regional or territorial level. The effects of forests in sustaining life on earth are indisputable, and forests are in the position of being the most precious natural resources (Atik et al., 2015).

The term "*forest*" is defined in the dictionary as "*wide area covered with trees*", which means a forest is any part of the surface of the world where there are trees (TDK, 2016). Defining the forest with only trees makes it difficult for us to understand its functions. First of all, a forest is a complex ecosystem in itself. Many factors whether living or non-living are related with each other and with the other factors in a multidimensional and constant manner. This network of relations constitutes the complex structure of the forest ecosystems. A forest is a living organism with the influence of the factors in this network of relations with its own metabolism. However, most of the time, it is not exactly possible to determine the weight of the load of the influence of each variable in this network of relations on the metabolism by reducing it to numerical values. Because, the indirect influence of a variable on another variable might be bigger or vital than its direct influence due to the influence of that specific variable on the other variables. The factors constituting the structure of the forest ecosystem are examined basically under two groups as the living and non-living factors. The non-living factors consist of the climatic, edaphic and physiographic factors. The living factors, on the other hand, consist of a wide variety of human beings, animals, vegetation, fungi and microorganisms (Çepel, 1995).

Water is the matter that exists in the organs of plants at the highest rate. For example, 60-85% of the leaves and 50% of the wooden parts of plants consist of water. In addition, water is also influential directly or indirectly in various processes in the metabolism of plants like photosynthesis, transpiration, nutrition intake and carriage, carbohydrate production, sustaining the hydration status of cells, the formation of the leaves, roots and the body, germination of seeds, and litter decomposition (Çepel, 1995).

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In the scope of this study, the relation between climate and annual precipitation, which is one of the climatic characteristics, has been examined. The climate and precipitation are also parts of the multidimensional relations mentioned above. In this context, the 2015 data of forest existence have been received from the General Forestry Management, which is responsible for the protection, planning and operation of the forests in Turkey. The relation between the forest areas in Turkey in provincial base, the annual precipitation in these cities received from General Management of Meteorology official website, and the Aydeniz Drought Coefficient, Erinç Precipitation Efficiency Index, and the De Martonne Drought Index have been examined in the study (GDF, 2016; TSMS, 2016).

As mentioned above, the status of the plants, flora and vegetation in any part of the geographical areas depend on many general or specific positional factors. Each of these factors might influence the plant development in a direct manner, or might have influences on the flora and vegetation structure with their direct and/or indirect influences on the other factor or factors. The form and duration of the precipitation in an area, and the moisture, temperature, wind, geographical area and soil properties, and the rain water amount in the soil are called as the *efficiency of the precipitation*. In general, if the precipitation in an area is more than the evaporation amount, the climate of this area is defined as a humid climate; if the amount of evaporation is more than precipitation, the climate is called as arid climate. The amount of precipitation is the amount of the atmospheric moisture falling to a certain area in a certain time period. Evaporation is the vaporization of water from the surfaces of solid matters, soil, from the surfaces of stagnant water and streams with the influence of the temperature, to mix into the atmosphere. This vaporization process is called as evaporation. Aside from evaporation, plants take water from soil with their roots and send it to their leaves. Almost 1% of this water is used for photosynthesis and the remaining 99% is sent to the atmosphere as vapor. This physiological event is called *transpiration*. The water loss on earth, which occurs together with these two forms, is called as *evapotranspiration*. Many formulas have been developed by various authors in order to measure *evapotranspiration*. After *evapotranspiration* is calculated, it is compared with precipitation to find the climate type of a certain place or the precipitation efficiency/ drought index (Erinç, 1962; Çepel, 1995).

The 3 methods mentioned above (Aydeniz Drought Coefficient, Erinç Precipitation Efficiency Index, De Martonne Drought Index) are considered among the methods that suit the conditions of Turkey. As mentioned by Çepel (1995) by referring to Erinç (1962), these methods also reflect the vegetation and climate relations, and are easy to apply. They provide us with multidimensional data on the climate of a certain area.

This study has been based on the data received from Meteorology Observation Stations located in 81 city centers of Turkey, and on the indices and coefficients of the drought and precipitation in a certain area, which have been determined by researchers. However, the data on forest distribution within the borders of a city, which are received from meteorology stations in the city centers, may not be in agreement with the real data in the same area. For this reason, the evaluations on the forest existence in the cities that are mentioned in the study do not have the property of having a stable structure or being sensitive, and have the property of being mere or superficial evaluations. Even in a study that is based on climate, the measurements must be performed in all the relevant areas where climatic data show variations, the climate types must be defined in the light of these data, and the relations between the forest existence and climate types must be revealed.

THE FOREST EXISTENCE IN TURKEY

According to the updated data in 2015, Turkey has a forest area consisting of nearly 22.3 million hectares. This means that 28.6% of the surface area of the country is covered with forests. However, according to the 2010 data of the FAO, the total forest area in the world is 4 billion hectares, which means that 31% of the total terrestrial area of the world is covered with forests. In this context, Turkey falls back in the world average values in terms of forest existence. However, another important point here is, again according to the FAO data, the forest areas in the world are becoming smaller, and a loss of 0.62% is observed in annual scale. As a matter of fact, the amount of the loss in forest areas between the years 1990 and 2010, i.e. for 20 years, is around 135 million ha. In other words, the forest areas in the world regressed in two-fold of the total terrestrial area of Turkey last year (FAO, 2010; Atik et al., 2015).

However, when the 1969-2015 period is considered, it has been determined that there is an increase in the forest existence in Turkey at a rate of 5.2 million hectares (FAO, 2010; Atik et al., 2015). According to the data released by General Management of Forests in the source called "The Forest Existence of Turkey 2015", the total forest existence in Turkey according to provinces is given in Table 1 (GDF, 2016).When the distribution of the forest areas to the geographical areas is examined, it is observed that 22% of the forest areas are located in the Black Sea Region, 17% in Eastern Anatolia, 16% in Central Anatolia, 14% in Marmara, 11% in Southeastern Anatolia, 10% in Mediterranean and 10% in Aegean Regions (Fig. 1).

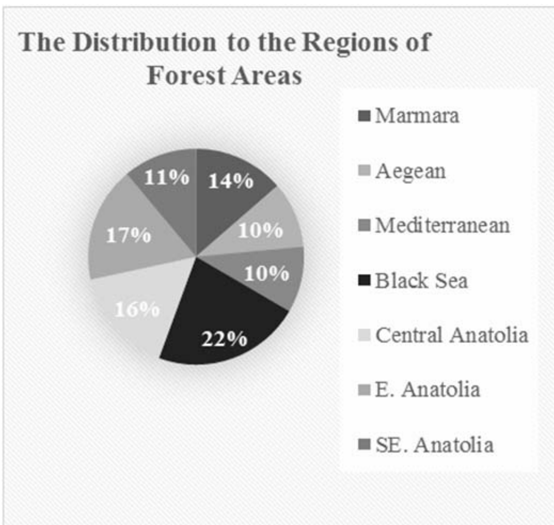

Figure 1. The distribution of forest areas in Turkey according to regions.

According to Table 1, the city with the highest forest existence is Antalya with 1 146 062 ha, and the city with the lowest forest existence is Iğdır with 161 ha. The biggest city in Turkey in terms of surface area is Konya with 3 957 121, and the smallest city is Yalova with 79 192 ha surface area. The average of the cities in terms of surface area is 983 020.33 ha. When the cities in Turkey are considered according to the forest existence, Karabük is in the first row with 70.79%, and Iğdır is the city with the lowest forest existence with 0.03%. The average forest existence of the cities is 31.66%.

Table 1*. Some areal and climatic data on 81 cities in Turkey.

No	Name of province	Area (ha)	Forest area (ha)	Prn. of forest area (%)	M1	M2	M3	M4	Geo. zone
1	Adana	1 417 417	583 860	41.2	688.2	0.79	26.91	13.13	Mediterranean
2	Adıyaman	731 084	158 581	27.7	574.6	1.09	30.34	14.11	SE. Anatolia
3	Afyon	1 427 376	286 307	20.1	466.4	1.06[a]	22.35[a]	10.91[a]	Aegean
4	Ağrı	1 087 975	5 905	0.5	465.6	0.56	42.47	18.03	E. Anatolia
5	Amasya	560 474	220 681	39.4	497.9	0.87	22.67	10.90	Black Sea
6	Ankara	2 577 976	441 242	17.1	410.2	1.14	23.19	10.77	Central Anatolia
7	Antalya	2 061 764	1 146 062	55.6	784.9	0.60	44.45	20.53	Mediterranean
8	Artvin	710 973	403 695	56.8	1007.6	0.43	42.03	17.55	Black Sea
9	Aydın	822 661	326 605	39.7	647.3	1.03	25.40	12.64	Aegean
10	Balıkesir	1 460 268	649 115	44.5	616.2	0.77	27.20	12.55	Marmara
11	Bilecik	419 565	228 675	54.5	546.1	0.74	25.84	11.48	Marmara
12	Bingöl	805 637	264 934	32.9	700.2	0.60	51.60	22.92	E. Anatolia
13	Bitlis	1 018 997	180 237	17.7	695.0	0.30	79.57	33.09	E. Anatolia
14	Bolu	819 169	531 802	64.9	589.2	0.48	32.92	14.99	Black Sea
15	Burdur	698 630	331 711	47.5	540.4	1.17	21.45	10.28	Mediterranean
16	Bursa	1 079 544	486 304	45.0	747.8	0.54	33.91	15.28	Marmara
17	Çanakkale	1 000 510	522 105	52.2	616.1	0.61	31.05	13.48	Marmara
18	Çankırı	769 942	192 120	25.0	451.2	0.81	22.82	11.01	Central Anatolia
19	Çorum	1 253 797	441 394	35.2	440.8	0.64	26.82	12.65	Black Sea
20	Denizli	1 217 993	588 672	48.3	583.8	0.86	25.48	12.17	Aegean
21	Diyarbakır	1 516 918	369 993	24.4	630.8	1.38	21.44	10.83	SE. Anatolia
22	Edirne	617 386	105 407	17.1	607.0	0.54	29.62	13.66	Marmara
23	Elazığ	913 111	169 892	18.6	589.6	1.47	21.96	10.38	E. Anatolia
24	Erzincan	1 179 862	212 216	18.0	529.4	1.16	22.01	10.47	E. Anatolia
25	Erzurum	2 470 416	256 882	10.4	579.6	0.72	34.06	14.69	E. Anatolia
26	Eskişehir	1 419 998	410 057	28.9	403.2	0.99	21.64	10.45	Central Anatolia
27	Gaziantep	688 660	112 617	16.4	568.1	1.02	25.94	12.66	SE. Anatolia
28	Giresun	711 632	258 140	36.3	786.9	0.22	69.87	26.87	Black Sea
29	Gümüşhane	591 592	234 726	39.7	605.4	0.79	28.60	13.16	Black Sea
30	Hakkari	753 662	152 236	20.2	682.7	0.75	50.75	20.38	E. Anatolia
31	Hatay	546 954	208 067	38.0	860.4	0.39	48.15	21.17	Mediterranean
32	Isparta	873 283	386 048	44.2	614.0	0.98	27.47	12.81	Mediterranean
33	İçel	1 563 068	840 470	53.8	559.5	0.97	25.70	11.52	Mediterranean
34	İstanbul	541 609	238 030	43.9	749.3	0.30[b]	51.47[b]	20.23[b]	Marmara
35	İzmir	1 182 170	470 910	39.8	612.2	0.92	30.60	13.80	Aegean
36	Kars	808 808	36 003	4.5	513.2	0.52	39.02	16.40	E. Anatolia
37	Kastamonu	1 339 223	892 102	66.6	694.8	0.59	30.48	13.77	Black Sea
38	Kayseri	1 742 082	112 831	6.5	450.4	1.05	22.85	11.33	Central Anatolia
39	Kırklareli	641 501	254 463	39.7	579.3	0.58	29.75	13.26	Marmara
40	Kırşehir	669 005	43 668	6.5	403.8	1.12	22.67	10.63	Central Anatolia
41	Kocaeli	337 426	143 227	42.4	811.7	0.36	41.89	17.86	Marmara
42	Konya	3 957 121	492 857	12.5	431.1	1.48	18.42	9.10	Central Anatolia
43	Kütahya	1 144 471	639 081	55.8	559.9	0.64	32.62	14.77	Aegean
44	Malatya	1 263 081	189 340	15.0	491.8	1.36	20.75	9.73	E. Anatolia
45	Manisa	1 332 567	539 648	40.5	577.1	0.84	31.73	14.75	Aegean
46	K.Maraş	1 433 300	521 413	36.4	573.7	0.88	31.86	14.87	Mediterranean

47	Mardin	874 277	126 916	14.5	529.9	1.12	34.79	14.83	SE. Anatolia
48	Muğla	1 227 859	830 378	67.6	817.5	0.43	54.35	24.35	Aegean
49	Muş	884 686	78 426	8.9	662.9	0.58	48.40	20.68	E. Anatolia
50	Nevşehir	517 365	7 056	1.4	521.1	1.07	27.29	12.07	Central Anatolia
51	Niğde	717 237	47 082	6.6	411.2	1.46	19.06	9.21	Central Anatolia
52	Ordu	587 114	202 896	34.6	852.7	0.27	57.22	22.80	Black Sea
53	Rize	383 729	178 949	46.6	1458.5	0.12	12.,85	47.07	Black Sea
54	Sakarya	488 650	208 226	42.6	754.4	0.34	43.70	18.91	Marmara
55	Samsun	975 104	388 821	39.9	657.8	0.42	37.57	15.36	Black Sea
56	Siirt	610 208	214 020	35.1	698.6	1.04	32.10	14.80	SE. Anatolia
57	Sinop	572 565	367 096	64.1	668.6	0.44	37.65	14.83	Black Sea
58	Sivas	2 819 148	309 144	11.0	480.1	0.90	29.54	13.23	Central Anatolia
59	Tekirdağ	628 510	103 701	16.5	607.6	0.48	32.57	13.48	Marmara
60	Tokat	999 067	478 378	47.9	559.0	1.02	24.10	11.27	Black Sea
61	Trabzon	521 299	197 856	38.0	929.7	0.34	45.13	17.97	Black Sea
62	Tunceli	775 188	224 261	28.9	607.2	0.72	42.56	19.00	E. Anatolia
63	Şanlıurfa	1 919 798	8 949	0.5	460.3	1.65	18.99	9.53	SE. Anatolia
64	Uşak	553 937	223 496	40.3	537.9	0.75	29.40	13.49	Aegean
65	Van	1 898 097	28 294	1.5	528.4	1.47	26.39	11.43	E. Anatolia
66	Yozgat	1 370 370	243 295	17.8	415.5	0.56	42.35	17.50	Central Anatolia
67	Zonguldak	346 160	194 075	56.1	944.0	0.25	73.57	27.78	Black Sea
68	Aksaray	780 843	11 148	1.4	351.3	1.43	19.52	9.55	Central Anatolia
69	Bayburt	363 809	29 793	8.2	647.8	0.79	32.90	14.33	Black Sea
70	Karaman	999 953	200 053	20.0	444.0	1.47	18.41	9.20	Central Anatolia
71	Kırıkkale	447 147	70 286	15.7	405.5	1.17	21.62	10.10	Central Anatolia
72	Batman	425 240	69 084	16.2	641.4	1.35	20.30	10.40	SE. Anatolia
73	Şırnak	672 427	240 590	35.8	645.4	1.23[c]	26.38[c]	13.07[c]	SE. Anatolia
74	Bartın	209 914	116 986	55.7	916.2	0.25	55.45	24.33	Black Sea
75	Ardahan	547 671	30 757	5.6	638.8	0.50	48.94	20.28	E. Anatolia
76	Iğdır	534 005	161	0.0	392.4	2.08	13.16	7.09	E. Anatolia
77	Yalova	79 192	46 618	58.9	801.4	0.40	38.52	16.28	Marmara
78	Karabük	389 553	275 755	70.8	689.4	0.38[d]	81.50[d]	32.00[d]	Black Sea
79	Kilis	131 457	27 032	20.6	593.9	1.38	22.16	10.90	SE. Anatolia
80	Osmaniye	331 318	158 635	47.9	782.0	0.68	35.49	16.90	Mediterranean
81	Düzce	241 092	124 390	51.6	802.1	0.33	45.24	19.81	Black Sea
	TOPLAM	**78 004 644**	**22 342 935**	**28.6**	**574.0**				

*This table is prepared by the General Directorate of Forestry and published electronically "Our presence Forests 2015 (GDF, 2016)" and the General Directorate of Meteorology Official Web Site (TSMS, 2016) received the data and information collected and prepared.
Model 1 (M1): Average Annual Rainfall (mm);
Model 2 (M2): Aydeniz Drought Coefficient;
Model 3 (M3): Erinç Rain Efficiency Index;
Model 4 (M4): De Martonne Drought Index
[a]: Dinar; [b]: Şile; [c]: Cizre; [d]: Values are calculated based on the average grade intervals over map.

The cities have been separated to 8 classes with class range 10 according to forest existence as given in Table 2. In this context, there are 13 cities whose forest area and surface area of the city rate is below 10%, and there is 1 city whose rate is over 70%. The categories according to forest area rates of the cities are given in Table 3.

Table 2. The forest rate categories according to equal class range (10%).

Proportional Categories according to Forest Area		The Distribution of the Cities according to the Forest Area Proportional Categories	
Number of category	**Percent of forest area (%)**	**Count**	**Percentage**
1	<10	13	16.0
2	10-20	15	18.5
3	20-30	9	11.1
4	30-40	15	18.5
5	40-50	14	17.3
6	50-60	10	12.3
7	60-70	4	4.9
8	>70	1	1.2

Table 3. The distribution of cities to categories according to forest rate.

Percentage of Forest <10%: Ağrı, Kars, Kayseri, Kırşehir, Muş, Nevşehir, Niğde, Şanlıurfa, Van, Aksaray, Bayburt, Ardahan, Iğdır.
10-20%: Ankara, Bitlis, Edirne, Elazığ, Erzurum, Erzincan, Gaziantep, Konya, Malatya, Mardin, Sivas, Tekirdağ, Yozgat, Kırıkkale, Batman.
20-30%: Adıyaman, Afyonkarahisar, Çankırı, Diyarbakır, Eskişehir, Hakkari, Tunceli, Karaman, Kilis.
30-40%: Amasya, Aydın, Bingöl, Çorum, Giresun, Gümüşhane, Hatay, İzmir, Kırklareli, Kahramanmaraş, Ordu, Samsun, Siirt, Trabzon, Şırnak.
40-50%: Adana, Balıkesir, Burdur, Bursa, Denizli, Isparta, İstanbul, Kocaeli, Manisa, Rize, Sakarya, Tokat, Uşak, Osmaniye.
50-60%: Antalya, Artvin, Bilecik, Çanakkale, İçel, Kütahya, Zonguldak, Bartın, Yalova, Düzce.
%60-70: Bolu, Kastamonu, Muğla, Sinop.
>%70: Karabük.

THE RELATIONS BETWEEN FOREST AREA RATES AND CLIMATE TYPES OF THE CITIES IN TURKEY

The results of the regression analysis performed to reveal the relations between climatic classifications in 3 different models, and the total forest area of the cities and the annual precipitation are given in Table 4. When the forest area percentage of cities is accepted as the dependent variable, the relation between 4 independent variables of climate (Average Annual Rainfall, Aydeniz Drought Coefficient, Erinç Rain Efficiency Index, De Martonne Drought Index) have been found to be statistically significant. When the R Square values are examined, it has been determined that the variance of the "annual average precipitation amount", which is one of the independent variables, to the "the rate of the forest area of the cities", which is the dependent variable, is 29.2%; the "Aydeniz Drought Coefficient" variable is 30.8%; the "Erinç Rain Efficiency Index" variable is 11.2%; and the "De Martonne Drought Index" variable is 11.9%. For this reason, the Aydeniz Drought Coefficient Method is the most successful method to explain the relation between the forest area rates of a city; and the Average Annual Rainfall, De Martonne Drought Index and Erinç Rain Efficiency Index Methods follow it (Fig. 2).

Table 4. Results of regression analyses explaining variation in percentage forest area of the cities.

Independent Variable	R^2	F	Sig.	Constant (a)	Constant (b)
Average Annual Rainfall	0.292	32.611	0.000*	-6.083	0.061
Aydeniz Drought Coefficient	0.308	35.088	0.000*	53.281	-26.546
Erinç Rain Efficiency Index	0.112	0.915	0.002*	18.886	0.366
De Martonne Drought Index	0.119	10.659	0.002*	15.379	1.053

*: Significant at the 0.05 level ($P<0.05$).

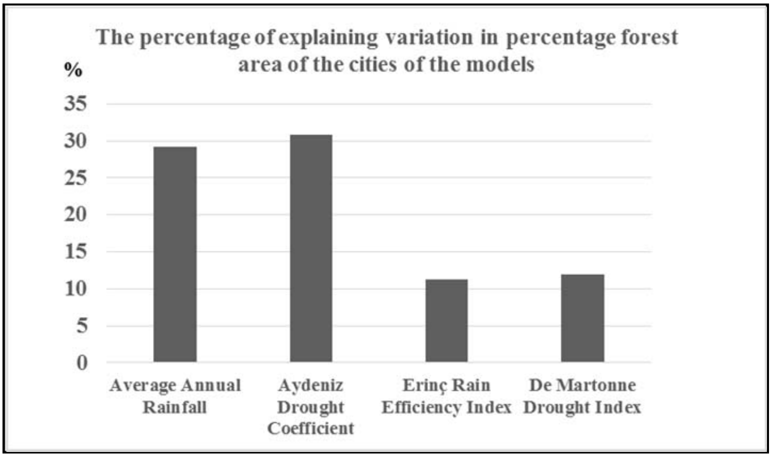

Figure 2. The success of the models.

The results of the correlation analysis and the relation graphics applied to determine the level and the relation between the climate types determined according to Average Annual Rainfall, Aydeniz Drought Coefficient, Erinç Rain Efficiency Index and De Martonne Drought Index Methods, and the forest area rates of the cities are given in Table 5-8 and Figure 3-6. Since the data in correlation analysis have non-parametric characters, the Spearman Coefficient has been used instead of Pearson Coefficient.

Table 5. Results of correlation analyses explaining the relation in between Average Annual Rainfall and percentage forest area of the cities.

Correlations			Percentage of Forest Area	Average Annual Rainfall
Spearman's rho	Percentage of Forest Area	Cor. Coef.	1.000	0.587
		Sig.		0.000
		N	81	81
	Average Annual Rainfall	Cor. Coef.	0.587	1.000
		Sig.	0.000	
		N	81	81

Table 6. Results of correlation analyses explaining the relation in between Aydeniz Drought Coefficient and percentage forest area of the cities.

Correlations			Percentage of Forest Area	Aydeniz Drought Coefficient
Spearman's rho	Percentage of Forest Area	Cor. Coef.	1.000	-0.516
		Sig.		0.000
		N	81	81
	Aydeniz Drought Coefficient	Cor. Coef.	-0.516	1.000
		Sig.	0.000	
		N	81	81

Table 7. Results of correlation analyses explaining the relation in between Erinç Rain Efficiency Index and percentage forest area of the cities.

Correlations			Percentage of Forest Area	Erinç Rain Efficiency Index
Spearman's rho	Percentage of Forest Area	Cor. Coef.	1.000	0.374
		Sig.		0.000
		N	81	81
	Erinç Rain Efficiency Index	Cor. Coef.	0.374	1.000
		Sig.	0.000	
		N	81	81

Table 8. Results of correlation analyses explaining the relation in between De Martonne Drought Index and percentage forest area of the cities.

Correlations			Percentage of Forest Area	De Martonne Drought Index
Spearman's rho	Percentage of Forest Area	Cor. Coef.	1.000	0.400
		Sig.		0.000
		N	81	81
	De Martonne Drought Index	Cor. Coef.	0.400	1.000
		Sig.	0.000	
		N	81	81

According to the correlation analysis results, the relation between the total forest area of the cities and the 4 independent variables mentioned above has been found to be weak.

According to Table 5-8, there is a positive relation at a rate of 58.7% between the total forest area rate in a city and the annual precipitation amount of that city; and a negative relation with Aydeniz Drought Coefficient at a rate of 51.6%; a positive relation with Erinç Rain Efficiency Index at a rate of 37.4%, and a positive relation with De Martonne Drought Index at a rate of 40%.

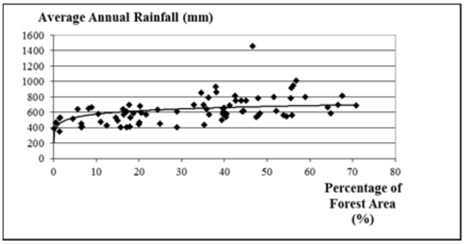

Figure 3. Correlation curve between the percentage of forest area and Model 1.

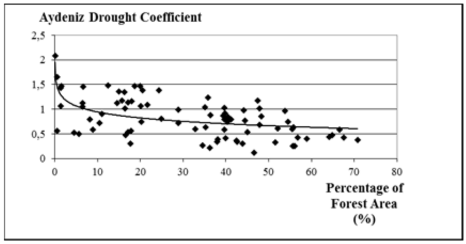

Figure 4. Correlation curve between the percentage of forest area and Model 2.

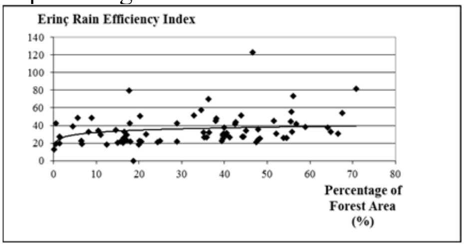

Figure 5. Correlation curve between the percentage of forest area and Model 3.

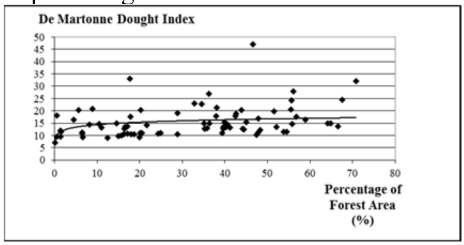

Figure 6. Correlation curve between the percentage of forest area and Model 4.

RESULTS AND CONCLUSIONS

The distribution of the forest in a region depends on direct or indirect, mutual or individual influences of many living or non-living factors like the precipitation and the amount of the moisture in the soil. In addition, all of these factors are in constant and firm interaction with each other.

Water is vitally important due to its duties in the bodies of the plants and in the metabolism, and also due to its influences on the factors that are influential on the development and spread of the plants. It has also absolute and limiting influences on the distribution of the forest in an area. When the general forest distribution of the forests in Turkey is examined, it may easily be understood that water, and therefore the precipitation, is extremely important. Because, the majority of the fertile forest areas in Turkey is located in wet areas where the sea has a major influence or where the humid air coming from the sea has major influences. It is observed that the northern sides of the Black Sea Region facing the sea, the southern side of the Mediterranean Region facing the sea, and the Aegean and Marmara regions are influential on the distribution of the forests, which stem from the geographical structure.

As it has been mentioned above, the influence of water, i.e. the precipitation in an area, on the distribution of forest distribution in Turkey has been determined. In other words, the relations between the climate types of the cities and the rate of the forest area in that city have been determined according to the formulas based on precipitation-evaporation developed by various researchers. In the regression analyses conducted for this purpose, it has been determined that the relation between the 4 models created with the forest areas of the cities (annual precipitation in the city center, Aydeniz Drought Coefficient, Erinç Precipitation Efficiency Index, De Martonne Drought Index) is significant. Based on this, correlation analyses have been performed to determine the direction and degree of these relations. According to the results of these correlation analyses, it has been determined that there is a positive relation between the forest area of a city and the precipitation in that city and the Erinç Precipitation Efficiency Index, De Martonne Drought Index; and there is a negative and weak relation between Aydeniz Drought Coefficient. In this context, the rate of the forest area of any city increases depending on the increase in the annual precipitation, Erinç Precipitation Efficiency Index, De Martonne Drought Index value; and decreases depending on the increase in the Aydeniz Drought Coefficient.

To summarize, the results that are obtained in this study are partly adequate to make superficial evaluations on the topic. However, further studies are needed in which more variables are included for the purpose of determining the factors that are influential on the distribution of the forest area in a region. Future studies must include the data that have high sensitivity levels and representation values. This is important in that these kinds of studies will increase the statistical significance level of the relation between the other factors and the distribution of forests, and allow more sensitive evaluations and interpretations on the topic.

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Chapter 50

Assessment of the Relationships Between Urban Furniture and Urban Spaces

Elif SATIROGLU*

INTRODUCTION

Mankind has spent the effort to arrange the surrounding environment since old ages and established living environments / settlements like villages, towns and cities. Public spaces have been created in artificial environments in time and these spaces have been shaped / changed / diversified with various functional sections. Urban living spaces have then been established to meet social, communal, recreational, aesthetic and ecological needs of people. Such spaces with various functions, entire uses and items, especially with urban furniture serve for the benefit of public. Urban furniture can be defined in different ways. They are defined as fixed equipment and structures placed over the entire open spaces of the city for various open-space functions with indefinite users (Akyol, 2006). Urban furniture may include various items or body of items with several functional and esthetic purposes and they may range from information-communication boards to trash cans, from a stairway in a square to a statue, fountain or telephone booth.

CLASSIFICATION OF URBAN FURNITURE

Temporary Use: Use of a certain section of an outdoor space for a moment while passing through it.

Permanent Use: Use of a certain section of an outdoor space for a certain period of time by spending time in that space.

Functional Use: Rather than using activities for certain functions, the uses of functions exerted instantly while using the outdoor space are gathered under this category. The shared furniture used to meet the needs of people in urban public spaces provides more than one functions and may be used for multi-purposes. Such uses include:

- *Protective purposes:* Traffic lights arranging intra-city traffic flow, traffic signs, lighting items,
- *Resting purposes:* Sitting items,
- *Cleaning purposes:* Garbage cans,
- *Entertaining purposes:* Urban furniture placed in recreation sites and playgrounds,
- *Sale and shopping purposes:* Kiosks, ticket booths, vending machines,
- *Communicative purposes:* Telephone booths,
- *Accommodation purposes:* Shades, sunshades, bus stops,
- *Directional purposes:* Floorings, street plates, under and over passes,
- *Restricting purposes:* Fences, railings, walls, planters, tree base protections,

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•*Informative purposes:* Billboards, square clocks,
•*Ornamental purposes:* Planters, statutes and waterworks.

CLASSIFICATION OF URBAN PUBLIC SPACES BASED ON URBAN DECORATION

Urban furniture can be classified as the items used to make urban life more pleasurable and meaningful and to create urban comfort and esthetics. Such a classification includes:

•Restrictors (persuaders, limiters, pedestrian barriers, traffic barriers and etc.),
•Sign and information plates (routers, positioners, information-communication boards, advertisements, posters, commercial plates, street plates – numbers),
• Under-cover items (stops, shades, pergolas),
• Lighting items (road illuminants, space illuminants),
• Sitting units (benches, chairs, sitting groups),
• Sale units (kiosks, booths, and etc.)
• Waterworks (decorative pools, fountains, water pumps, canals, fire hydrants and etc.),
• Other items (flag poles, trash cans, post boxes, public toilets, planters, ticket automats, bicycle parks, clocks, park meters and etc.).

THE SPACE CONCEPT

Mankind has felt the sense of space, reduced this sense into special units to protect themselves from negative impacts of nature and turned it into a specific space or place for him. The space created by mankind and imitated nature and its components constitute natural and artificial environments so called as “physical environment”. However, this physical environment cannot be separated from the mankind encompassing and adding item to it and activities, in brief from the life so called as social and cultural environment (Yıldızcı, 2001). Although spaces can be gathered under different categories based on their physical attributes, each space is unique with environmental characteristics and impacts.

The space includes both physical attributes like material, shape, texture and color and hard-to-define cultural components created by the mankind in time (Tranck,1986).

All environments are composed of complex interactions of these four items. Reflections of the past and culture play significant roles in place acquisition of the space.

According to Roth (2000), spaces can be classified as physical, perceptual, conceptual and behavioral.

Physical Space; a space which can be imaged as a volume or easily be defined,

Perceptual Space; a comprehensive perceptible-visible space which cannot be actually quantified,

Conceptual Space; a space which can be defined in plan and easily comprehended by the user,

Behavioral Space; a space in which motion is on and actually used.

Although all these types of space are described in different ways, they are different expressions of the same space and used for description of both single and outdoor spaces.

In this sense, urban environments with both functional and physical quality attributes are actual habitats as long as these space types are served to societies in a hierarchy and inflow.

Architectural space

The attribute stopping the structures from being three-dimensional masses should have a space. Architectural space can be defined as a zone physically separated by three restrictor items as of floor, wall and ceiling. Indoor space is the shaping of nature by the physical existence of these three items. Every architectural structure has an indoor space and contributes alone or together with the other structures to formation of an outdoor space (Öksüz, 2004).

Urban space

Urban space is a special definition of open spaces and directly related to architectural space which is basically the incarnational form of existential space. Although urban space and architectural space had similar meanings in the past because of continuity in between them, architectural space structurally and perceptively insulated with modernism and they gained the characteristics of being the space of independent structures (Öksüz, 2004).

The spaces in which common or individual needs are met and differentiated in time based on socio-economic and cultural structure of the society are called as "urban spaces". Urban spaces are the body of spaces in which 4 basic functions (accommodation, occupation, entertainment, transportation) of human life are implemented (Öksüz, 2004).

Successful urban spaces are usually the indicator of a quality life. There is activity, sensation richness, esthetics and vitality in these spaces. "Successful urban spaces" can be mentioned in cities hosting structures, urban spaces and urban furniture. Successful urban space is quality urban space. Quality urban space is the space allowing "urbanizing" which can be defined as urbanite. Urbanized mankind is an individual adopted urban-specific life style and behavior patterns, integrated with urban environment and has a compatible participation into urban life (Velioğlu, Araz, Tavşan 2003).

TYPES OF URBAN SPACE

Distribution and organizations of urban outdoor spaces in which daily life goes on vary based on social data. According to A. Rapoport; every city can be approached as an extension of special and social sub-systems changing with different gradation and fragmentation in them. This reflects the value system, life style and culture (Rapaport, 1977).

Urban outdoor spaces are the spaces in which all activities of communal life are carried out. These spaces can be gathered under four groups as of:

- Private spaces,
- Semi-private spaces,
- Public spaces,
- Semi-public spaces.

Private spaces

They are the spaces for the private use of a certain individual or a group. They can be structured or unstructured private spaces. Structured private spaces include construction spaces, business places, private agricultural, industrial, service and etc.

spaces and unstructured spaces include building plot, field, yard and etc. spaces.

Semi-private spaces

They are the spaces belonging to a structure, can be seen from outside, owned by an individual and visually benefited from the others. Front and back yards of a house, balconies of an apartment can be the examples for such spaces.

Although these spaces are under the private ownership, there is a social inspection over them. Semi-private spaces of cities are the spaces in which social activities take place, friendships are made and refreshed (Öksüz, 2004).

Public spaces

They are the body of spaces in which the activities required by the communal life take place, benefited from every age, gender or professional groups and sometimes are used in controlled fashion (Özaydın, 1989). Public spaces can either be structured or unstructured. Structured ones include service, management, industry, lodging, entertainment structures. Unstructured ones include squares, streets, parks and avenues.

Semi-public spaces

Ownership of these places belongs to either a group of urbanite or public administration. The responsible ones are the users and public administration. Yard, shared garden, parking lot, stairwell and etc. can be given as the examples for such places. Urban public spaces are the places in which urbanites meet and communicate with each other. People may need some special equipment in these spaces. This special equipment is urban furniture including floorings, sitting items, bus stops, planters, illumination items, telephone booths.

CLASSIFICATION OF URBAN FURNITURE BASED ON SPACES THEY PLACED IN

- Transition zones – Streets, pedestrian ways
- Squares and sections – Historical sections, new sections
- Shopping spaces
- Parks
- Playgrounds
- Sports sites

Transition zones – streets, pedestrian ways

Avenues, streets and roads are the routes over which people move on foot or with vehicles. Roads are the items providing mobility of urbanite and city between structure islands. They also serve a connection between various functional sites.

Streets should be spatial entities rather than being remainder spaces of structural occupancy.

Pedestrian ways are free of vehicle traffic and relatively occupied by the pedestrians or immobile vehicle traffic. These spaces serve to city people in physiological aspects (kiosks, teahouse, club etc.), sociological aspects (meeting and communication places) and economic aspects (shopping opportunities) (Fanusçu, 1994).

In large cities; pedestrian-oriented road networks should be arranged among intensely used spaces like bus stops, shops, schools, playgrounds, health organizations with the following characteristics;

• Arranged according to pedestrian flow, not detouring,
• Connecting the spaces open for public,
• Serving for more than one function (Kentsel Tasarım Kılavuzu Çalışma Gurubu, 1992).

Squares and resting places

Squares are the spaces from where urban circulation started and distributed, in which people gathered from the start of very first urbanizations to today. With the initiation of planned urbanization, squares have become the focal points of the cities and people usually gather in squares for social, religious, commercial or other purposes. These spaces constituted the most significant points of the cities surrounded with important buildings in time.

Squares can be furnished by corners with symbolic expressions, statues, waiting spots, educative spots, illuminated sections, special sections with square clocks, small verdant squares and inner courts.

The sections with historical identity

Historical places are shaped with cultural background of the society and constitute a bridge between the past and the future. They are cultural environments able to survive till today with their historical data, architectural heritage, traditions and beliefs. Historical environments pass architectural, social, economic, technological and cultural data of the societies, feelings, thoughts, trends, social life, experience and accumulations of the time of construction to the present and improve perceptibility of the cities. They are the crucial points in physical and social structure of the city and bring an identity and qualification into the cities and towns (Velioğlu *et al*., 1993).

The design of a new structure in a historical environment and design of urban furniture may not include the same perceptions. The new design either complies with the environment or contrasts with the environment or may imitate the forms already existing in the environment. The urban furniture to be used in historical places should comply with the environmental identity with regard to form, color, texture or material. In some case, although a harmony is achieved through creating a contrast, such furniture should not create a visual pollution or disharmony and special design should be used in those cases. Although some standard items can be used in those environments, most of the time special designs should be employed. Consistency in urban furniture to be used throughout the city will play a distinctive role in urban silhouette and identity. In this way, physical environment will be made more impressive and descriptive.

Presentation of new form perceptions for urban furniture design in historical places in an impressive fashion will only be possible through the interactions among the material, color and texture to be selected. While natural materials, stones, glass and metal are approved in historical places, use of plastic should be prohibited in such places. The urban furniture for collective use should especially be durable. Durability is considered in material and it is also quite significant with regard to craftsmanship in implementation phase. Urban furniture design and selection in historical cities require a visual harmony process. Beside the designs reflecting the historical city, use of new designs pointing out the cultural continuity will improve visual diversity and reflect the cultural richness. The material, color, texture and design to be selected in urban furniture design will improve stylistic value and will make the quality of historical places more distinctive. The designer responsible for rearrangement or design of urban spaces should well-apprehend the requirements of the users for urban spaces and furniture, their values coming from the past and their expectations. Technological developments resulted in changes in region, city, urban space and urban furniture concepts and perceptions and confront the designer with new problems to be solved.

As to conclude, urban furniture design and implementations in historical places are quite significant issues. The basic determinants of such designs are as follows:

• Identification of own traditional / spatial language of the region (form – space relations are significant in this context),

• Having a function proper for the use of people,

• Having a long-lasting structure able to stand for long times,

• Having a style able to transmit a thought or an experience,

• Bearing the items representing the characteristics of the historical texture in which it exists,

• While bearing with all these attributes, being genuine and impressive (Güzel, Sözen 2003).

Shopping spaces

Shopping spaces are the physical places in which shopping actions go on and these places can be gathered under five groups:

• Open bazaars

• Roads with shops

• Areas surrounded by shops

• Department stores

• Shopping centers (Özdeş, 1975).

Parks

Parks may exhibit differences in size, functional diversity they hold and utilization frequency of equipage. They serve to urbanites in a broad range extending from a resting place of an apartment to regional parks outside the cities.

Parks can be classified in different fashions based on their sizes, functional diversity, area of affection and the population they served. The parks generally based on size and area of affection, are classified as regional parks, city parks, district parks, street parks and small parks or pocket parks (Oğuz, 1998).

Playgrounds

Playgrounds are diversified based on the growth stage of the children they served to, type of games they offered and furnished-unfurnished state and they all have different characteristics.

Child playpens: They are safe and small playing spaces with close supervision of the parents (entrance of the buildings, front yards and etc.) and serve especially to 1-3 years age group. They may be furnished with a small sand-box, simple climbing and sitting equipment.

Children play fields: They are unfurnished urban green spaces with varying sizes and distances from the houses based on the age group they serve (usually serve to children from 3-years to adolescent). They can be semi-private / semi-public (front yards, building block quads and etc.) and public (urban plot specially designed for playing purposes). They are unfurnished. Soft landscape items (grass, tree, shrub and etc.) or ground roughness (hillocky and etc.) and artificial landscape items (partitioning cover items, and etc.) and flexible playing equipment can be used in the design of these spaces (Aydemir,2004).

Children's parks: They are furnished playgrounds serving for a wide range of age groups starting from two years extending to 10-12 years. They usually allow children to play imitation games without any rules. They can be classified as traditional and modern based on the functions of playing equipment (either single or multi-functions).

Traditional children's parks: They usually include common monotype static but safe playing equipment made of galvanized metal, steel or wood. Equipment does not allow different uses; teeterboard, swing, slide, swinging-climbing bars and rolling wheels are among this equipment.

Modern children's parks: They usually exist as an alternative to traditional children's parks, playing equipment has uncommon forms, texture, color and aesthetically please the eyes. They are generally made of fiberglass and wood materials with live colors and include turtle, fish, ship, statue and etc. attractive forms. The creative items in modern ones usually have 60% more than traditional ones. Such a rate is quite higher in imitation games related to creativity. The time spent by the children is higher because of diversity in playing opportunities. Opportunity diversity can be created through gathering various playing equipment with well-defined uses and through together design of well-defined or undefined (water, sand, and etc.) playing equipment (Aydemir,2004).

Adventure playgrounds: In such spaces, children test themselves about what can they do in a freedom atmosphere. They learn how to stand on their own feet and the responsibilities assigned to them with freedom through experience in these places (Bengtsson, 1972). Playing equipment can be soil, water, fire, wood, brick, canvas, fabric, paper, rope, automobile tires, nails, hammer, saw, shovel, hand barrel and etc.

Playing parks: Beside adventure games, these places include hobby activities (painting, model works and etc.) requiring calm ambient. They serve for the same age group with adventure parks, but children spend more time in playing parks (Allen, 1971).

Other playing spaces: Streets, pedestrian ways, even parking lots and similar public places have become inevitable flexible playgrounds in all cultures and ages (Aydemir,2004).

The design of playgrounds is finalized by taking the desires of child, family, society and administration, natural and artificial environment data, available budget, accessible playing equipment into consideration. Therefore, there isn't any ideal design, each playground requires specific solutions. However, following issues should be considered in playground designs:

• Playing spaces are social centers for children and they have essential furnishing. This furnishing includes easily accessible toilets, protected places from the wind and rain, sitting places, well-defined or undefined playing equipment / tolls / opportunities. Playgrounds serve an environment for mental, emotional and physical development of the child. Therefore, playgrounds should allow various child activities including social games, constructive games and physical games (URL,2001).

• Most of the traditional playing equipment (slide, teeterboard, swing and etc.) promote general motor activities and contribute to physical development of the body.

But they don't respond to other requirements. Game alternatives should be increased.

• Water, sand and construction materials are quite efficient tools to allow children to interact and corporate with each other.

• Playing items, equipment and tools should be safe both in material and design.

• The physical and mental characteristics of the age group to be served should be taken into consideration.

• There shouldn't be high fences, walls and etc. visual barriers between children playgrounds and activity spaces of adults.

Sports sites

Sport is a competitive leisure time activity requiring physical energy and skill. It is also a cheap, easy but a significant activity for character development of the society and treatment of physical and mental diseases. In relevant literature, sportive activities are classified based on the seasons they performed, whether or not they are organized (team sports – individual sports) and their origin (urban or rural originated). However, it is quite significant to classify sports based on characteristics like implemented within the city or outside the city, exercised either in open or closes places, whether or not requiring an arrangement and/or an equipment. Within this context, sportive activities can be gathered under six groups as of:

• The sports exercised at home or a sports center, either not requiring equipment or requiring limited equipment; aerobic, steps, and etc.

• The sports exercised in closed facilities and requiring limited equipment; wrestling, Far East sports, fencing, boxing, table tennis, weight lifting, body building, and etc.

• The sports requiring arrangements in city; jogging, skateboarding, rollerblading, cycling, fishing, hunting and etc.

• The sports exercised in open and/or closed facilities requiring special spatial furnishing in cities; football, basketball, handball, volleyball, tennis, shooting, golf, riding, ice skating, swimming, canoeing, go-kart, and etc.

• The sports requiring limited public furnishing outside the city; mountaineering, tracking, water and terrestrial hunting, rafting, and etc.

• The sports requiring furnishing outside the city; skiing, parachuting, and etc. (Aydemir, 2004).

CONCLUSION

Urban furniture is used intensively within the urban life and urbanites are in continuous interaction with this furniture. They are quite well-designed products belonging to whole urban space and used either individually or socially. The works of "Public spaces arrangements" initiated years ago in developed countries and have recently been initiated in Turkey. The objective of such works is to provide more livable environments for urbanites. Urban furniture is used to create more livable environments in urban spaces. Urban furniture provides contributions to spatial and areal dimensions of the city. Proper design, placement and maintenance of urban furniture are significant issues. Their functions are essential in urban life and order, therefore design, production and placement of urban furniture require an expertise and responsibility. The image to be created at the end of a certain arrangement should comply with and support the urban identity in one hand, serve for and ease the urban life and apprehend an esthetic value to urban places on the other hand.

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Chapter 51

Sustainable Landscape Design in Contemporary Residential Gardens

Fatma AŞILIOĞLU*

INTRODUCTION

The main objective of the planning studies in metropolitan areas is to offer living opportunity in a well organized environment. The quality of urban landscape is crucial for establishing livable and sustainable environments. Such an urban environment is possible by considering all urban landscape components needed by dwellers and users and by their organization correctly. Housing, which is one of these components and forms a significant part of structuring activities in cities, must be developed based on landscape planning and design principles. According to Othman, Ujangi, Dola, Mohd Ali, and Mohd Yusof (2014), a landscape planning and design with the purpose of establishing an aesthetic as well as sturdy, useful, substantive and conductive urban environment is possible by considering factors including site, infrastructure and facilities holistically.

Housing is a core requirement for humans and is essential for ensuring a sustainable environment. Thus, it acts as a pivotal component to connect economic development, environment and social wellbeing (Smith, Clayden, & Dunnett, 2008). One of the important reasons for structuring in metropolitan areas, whose population increase swiftly, in developing countries is to meet increasing residential need. Contemporary residences built as multi-floor gated housing estates especially in high land value districts have become a dominant component of urban environment during the past decades. Akyol Altun (2008) highlights that the population movements, economic policy effects, economic recovery, revival in the construction sector and market surge have increased residence construction, and various residential regions and types have emerged in Turkey after 1980. Quality life searches of users who seek to lead life according to their social statue especially were met by gated residential housing estates built in limited number of empty plots within city first. Thus, housing estates consisting of multi-floor residential blocks or multiple residential complexes started to spread in cities as well.

Diminishing open green spaces in cities has become a significant criterion for their users in their residence selections today. Characteristics and amounts of open green spaces meeting mental and physical needs of people are accepted as an indication of civilization and life quality in developed countries (Gül & Küçük, 2001). Landscape design can be applied to achieve a more sustainable community and to contribute to a balanced environment. A better living environment and an increase of the value of housing property can be ensured by modification of a residential community by means

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of natural and constructed landscape design (Shahli, Hussain, Tukiman, & Zaidin, 2014). Gated housing estates that are designed as multi-floor blocks in areas within cities after 2000's in Turkey have become an investment tool and statue indications in addition to sheltering. Considering the marketing strategies of these residences, it is seen that security and landscape design as well as interior space have started to gain a critical aspect (Mutdoğan, 2014). Bekdemir (2007) has determined in his study conducted in a collective housing settlement that dwellers selected their residences based on open green space, security and placid and civil environment reasons. According to Hussain, Tukiman, Zen, and Shahli (2014), safety and comfort are essential to achieve a better living environment and a sense of security for users by the usage of landscape design. Therefore, a sense of security and safety for the residential environment can be created by applying landscape design such as fences and buffers based on the comfort and safety choices. A comfortable environment for the user can be ensured by safety and security. Plants as a landscape component are also crucial for selection of housing.

Landscape design in cities targets outdoor spaces generally although in different scales. Contradicting indoor spaces, outdoor spaces are wider and more unconstrained in terms of form. Horizontal measurements are much larger than vertical measurements. In outdoor spaces, there is less structure, and structuring is more natural and less mandatory, and forms are more informal. Outdoor spaces are temporary living settings used in short time frames and are reserved for common use (Bekdemir, 2007). Landscape design utilizes these and combines arts with environmental, physical and biological characteristics of outdoor space. Well-defined landscape space can improve the characteristics of living areas to fulfill people's choices. Landscape design is not only related to plant material but also it concerns hardscape by complementing plants for achieving a prospering design (Shahli et al., 2014).

Contemporary residence in today's cities first implies multi-floor housing estates constructed in districts with high land value in city centers. In terms of usage, the gardens of these residences can be considered neither as a single residence nor as parks that serve to common usage. These are preserved areas as well as areas addressing numerous dwellers and affected by constantly changing usage, maintenance and renewal studies. Thus, sustainable landscape design (SLD) has become more significant for such areas in time. Sustainability must be considered and aimed during both landscape construction design (LCD) and landscape planting design (LPD). In this chapter, SLD, its principles, applications and gains are focused and its applicability of contemporary residential gardens are examined. For this purpose, the garden of Zirvekent Zambak Housing Estate, situated on 26684 city block and 2 plot in Çankaya district of Ankara, was chosen as the study area. Its landscape design project was made by the author in 2005 and its construction was completed in 2006 by a landscape contractor. The current state of the area was examined and the 10 year evolving of the LCD and LPD was assessed in the scope of SLD criteria.

MATERIALS AND METHODS

Literature review, the project area, its landscape design and observations on current state of area, made up the main material of the study. Subjects including SLD concept, principles, gains and its effects on dwellers in contemporary residential gardens were investigated and the study area's state was analyzed in the light of these elements. The study area was Zirvekent Zambak Housing Estate garden situated on 26684 city block and 2 plot in Çankaya district of Ankara (Figure 1). The housing estate consists of a total of 5 blocks, 3 blocks among these consist of 14 floors and 1 block consists of 6 floors excluding the basement and ground floors. The total area is 27.558 m^2. The construction of the residences was completed during January 2005 to September 2006. The landscape project including LCD and LPD was made by the author in 2005 and it was ratified by Çankaya Municipality on 22.04.2005. The ratified landscape project was constructed during 29.03.2006 to 10.08.2006 with the negligible changes.

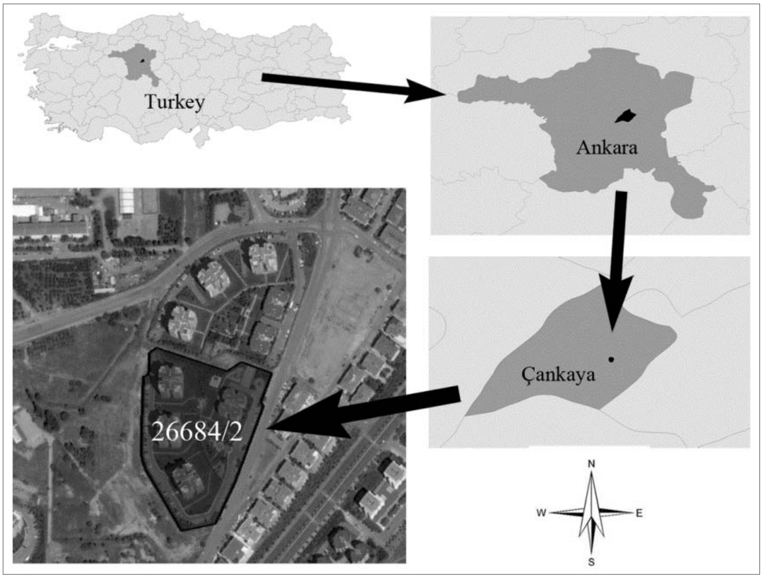

Figure 1: Location of the project area

Despite the design process was carried out based on SLD principles, factors including building bylaws, employer desires, architectural project and the area characteristic directed the design as well. All designed components of the landscape was assessed in the scope of sustainability principles and compared with the current state and the rate of achieving the SLD target was determined. For this purpose, interviews were held with the housing estate management and the persons in charge of its maintenance, photographs were taken and construction and planting materials were determined on site.

FINDINGS

Sustainable Landscape Design

Sustainable planning and design concept has emerged for building of long-lasting economic structures that are sensitive to human health and with minimum environmental effects during the design, construction and usage span of residences (Ünal, 2014). The main objective in SLD is ensuring the integration of humans and nature and at the same time achieving sustainable development of social, economic and cultural values (Dong-dong, Yu-shan, & Le, 2009). Very small scale landscape gardening that started with the birth of humanity has yielded to wider scale landscape designs as a result of an upsurge of social settlements.

Landscape design is linked by the sustainability concept and has become one of the major topics of landscape architecture discipline due to factors including an increase in environmental pollution and depletion of raw material sources, and with the nature not to be able to renew itself (Yaşar & Düzgüneş, 2013). SLD has three pillars: Social suitability, environmental compatibility, economical feasibility (Figure 2). The current inclination in the practice of landscape architecture is to find the balance of aesthetics and function required for successful sustainable design (Bean & Yang, 2016).

Figure 2: Pillars of SLD (adapted from Bean & Yang, 2016)

A quality sustainable design aims to generate aesthetic, functional, sustainable and cost-saving landscapes fitting well for a certain location or region. Maximally sustainable landscapes can be achieved in short and long terms with this approach. The eight key factors in SLD are as follows (Cook & VanDerZanden, 2011):

Adhering to a SLD method
Selection of appropriate plants
Establishing landscaping that is pleasant aesthetically
Establishing functional landscaping
Fulfilling physical and mental basic needs of people
Minimizing maintenance works
Keeping the short and long term costs low
Considering the desires of the users about the design

Figure 3 shows the steps of the process to achieve a more sustainable landscape in the long term.

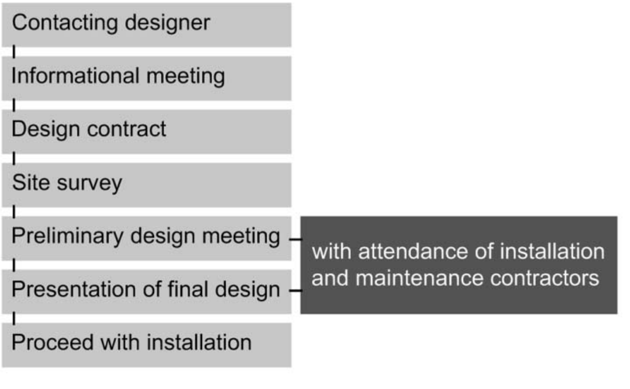

Figure 3: Steps of SLD (Cook & VanDerZanden, 2011)

Most landscapes include a combination of hardscapes, turf areas, and ornamental plants. The diverse products available on the market today make it possible to select from a wide variety of hardscape materials, many of which will enhance the overall sustainability of the landscape (Cook & VanDerZanden, 2011). Hardscape material should be selected by considering following criteria (Thompson & Sorvig, 2008):

Finding local materials
Using slightly processed materials
Using materials that require minimum energy for their procurement
Using recycled or reusable materials
Avoiding petroleum-based materials
Using durable materials in terms of structure and design
Avoiding toxic materials during construction and production
Using durable wood absorbing CO_2

Essential ecological, aesthetic and functional characteristics of plantation in residence gardens are creation of space effect and identity, climate control, background formation, enclosure, bordering, screening, accenting, directing and noise and erosion prevention (Dönmez, Özyavuz, & Gökyer, 2015; Hussain et al., 2014; Patil, 2013; Thompson & Sorvig, 2008). Plants contribute form, texture and color to the landscape as basic elements to express the principles of design (Shahli et al., 2014). Plant selection is essential in landscaping where planting design is a basic step. Plant selection must be based on the physical environment, soil type, water quality and climate. These components need to be analyzed for appropriate selection based on plant requirements. Successful landscaping is achieved by appropriate selection based on site conditions. Significant clues for selection can be obtained by observing local varieties. Local varieties must be used for successful landscaping and this also leads to specific identity of the place (Patil, 2013).

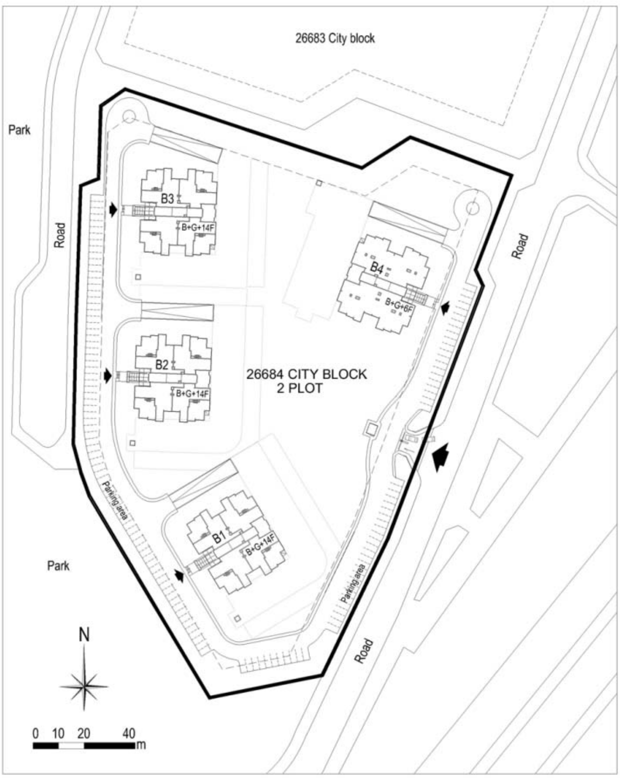

Figure 4: Layout plan of the project area

The LCD and Time Effect on It

The layout plan and architectural design included in the approved architectural project of the project area were directive and determinant for landscape design. The positions of the entry point, vehicle roads, open and enclosed parking areas and block were determined in the layout plan (Figure 4).

The enclosure wall was built during the block construction as well. The landscape design process was developed on this basis. 3667 m^2 of the project area is the building area, 5047 m^2 of it is the open parking areas and vehicle roads. LCD and LPD were made for the remaining 18.844 m^2 of area. The maximum slope of the area is approximately 4%. 5983 m^2 of the area for which a landscape design is to be made is situated on the enclosed garages as shown in the layout plan. Constructional landscape components were not used in these areas since the load design proposed in the static project for the enclosed garage deck cannot be exceeded and adequate anchorage depth cannot be provided.

The first stage of LCD is determination of the constructional landscape components. The usages were determined by considering that the area is an enclosed housing state and the users are the housing tenants in various age groups. Figure 5 shows the LCD project and the list of constructional components.

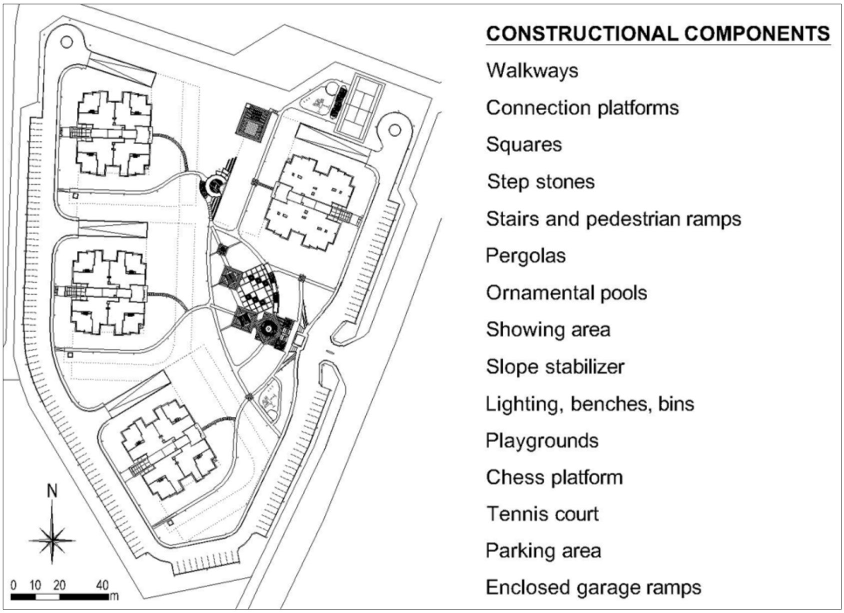

Figure 5: The LCD project and the constructional components list

When the project was studied 10 years after the project implementation, it was observed that the constructional landscape remained as original substantially (Figure 6). Majority of the ground covering in the project area consists of walkways, connection platforms, squares, step stones, stairs and ramps (Figure 7). Bush hammered andesite and travertine plates were used in scavenge concrete walkways to obtain a laying pattern, limit the edges and to achieve divisions for preventing concrete surface cracking. Marble strips were used in the connection platforms underlining the crossing points of the walkways and between the andesite and travertine plates, and a laying pattern was generated. Bush hammered andesite and travertine covering is suggested in both the squares remaining under the pergolas and in the open squares. The step stones connecting the building back-entries to the main pedestrian circulation are andesite and are detailed to be placed on grass directly. Rock gardens are generated from natural stones in various sides of these roads to achieve movement to the flat surface. Bush hammered andesite was preferred as a covering material in the stairs steps and pedestrian ramps. Andesite, used in the project details greatly, is unique to the region, natural, durable and easily found when repair is necessary and it is a covering material used in outdoor spaces due to its rough surface. Koca, Yavuz, and Kıncalı (2001) reported that andesite had a higher pressure resistance in comparison to many natural stones used as a covering material.

Figure 6: The LCD in 2006 and 2016

Travertine, on the other hand, has both low pressure resistance and a high possibility to be affected from frost damages since it has a porous and layered structure. Therefore, it is used scarcely and for visual purposes. Marble was included for only generating a laying pattern due to its sliding risk in the outdoor space. Considering the current state of the ground covering, it was observed that there was no deformation or need for renewing other than the slight corrosion and color changes on the surface during the 10 year period. There are breakages in the travertine covering although rarely.

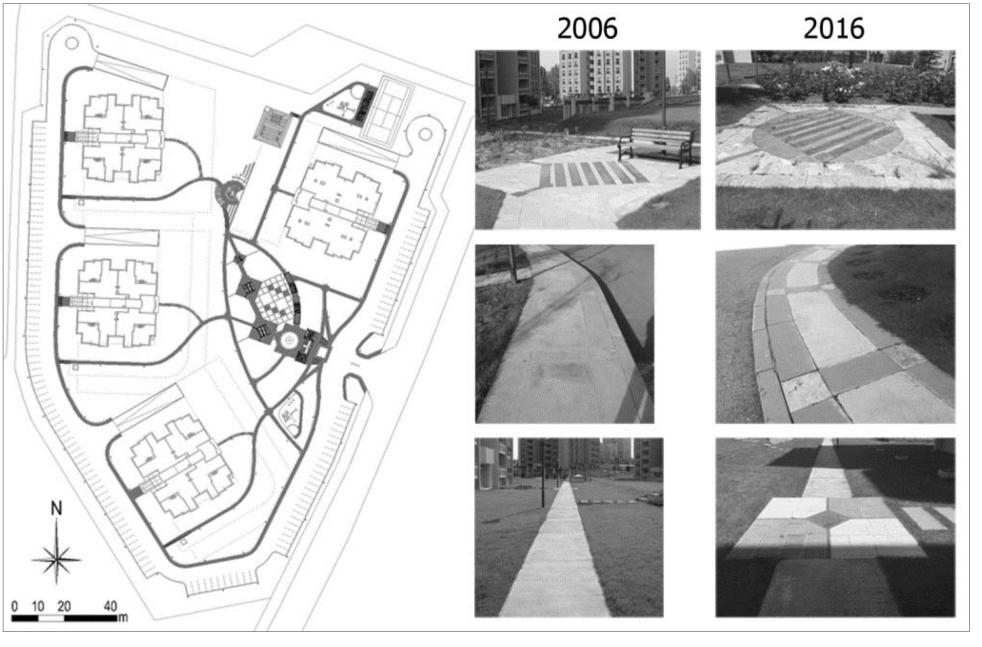

Figure 7: Ground coverings of the project area

All pergolas in the project area were designed to be beams and spaced covering-material of various dimensions and manufactured from wood on reinforced concrete columns of 25x25 cm cross sections (Figure 8). Durable and long lasting reinforced concrete columns were preferred due to the large dimensions of the pergola and excessive roof load. Durable and not deflecting wood material of 10x30 cm cross section is suggested for the beams. Wood is used for being an aesthetic, warm and natural material. It is suggested that easily-found and low-cost Pinus sylvestris timber is used by two-layer varnishing in the design to be protected from outer influences. Surface of some pergolas was covered with asphalt shingle to provide full shade during the past ten years by the administration. Although cracks are seen in the re-varnished wood sections, there is no situation observed requiring repair. There is no deformation in the reinforced concrete carriers.

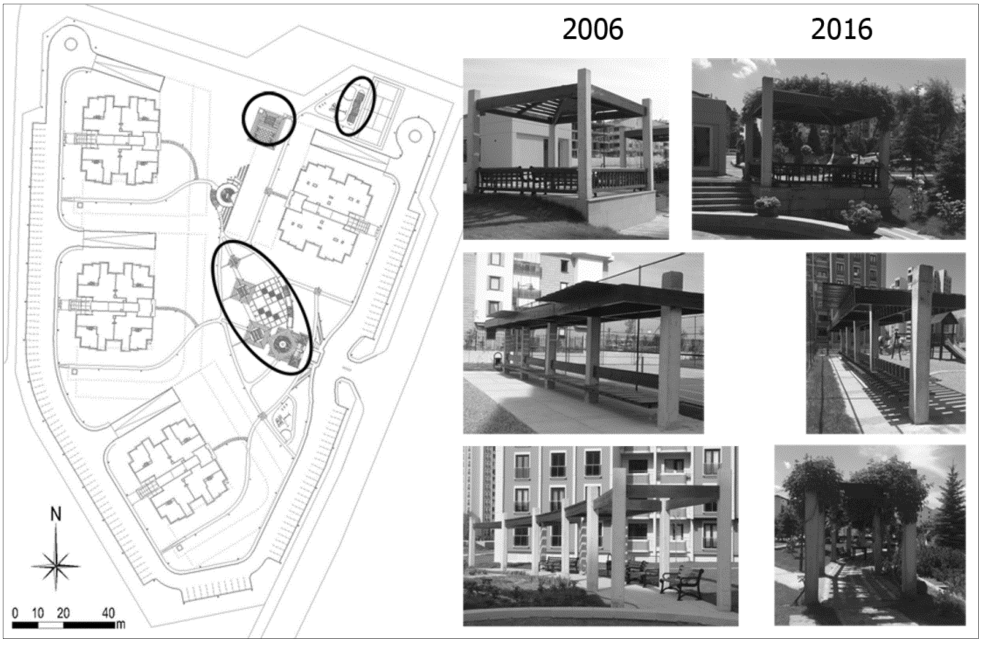

Figure 8: Pergolas of the project area

Marble covering and block andesite coping of 30x10 cm cross section was used in the ornamental pools (Figure 9). Water-pouring platform was designed as a travertine plate of 120 cm diameter and 10 cm thickness that was cut circularly. A circulation system was used in the ornamental pools where water shows are held by foamed geyser heads. Water insulation was made easier and safe since the marble pool covering was applied as wide plates. Moreover, it presents a practical cleaning and aesthetic appearance. Andesite coping and travertine pouring platform of a large dimension were preferred to accent water surface and movement. Considering the current situation, changes, deformations or breakdowns requiring repair were not observed in the visible sections of the ornamental pools. However, it was reported that repairs were made in the installation and circulation system at times by the administration.

A water, light and plant show area of an approximately 218 m^2 was designed in the project area (Figure 10). The area is at approximately the middle point of the design and

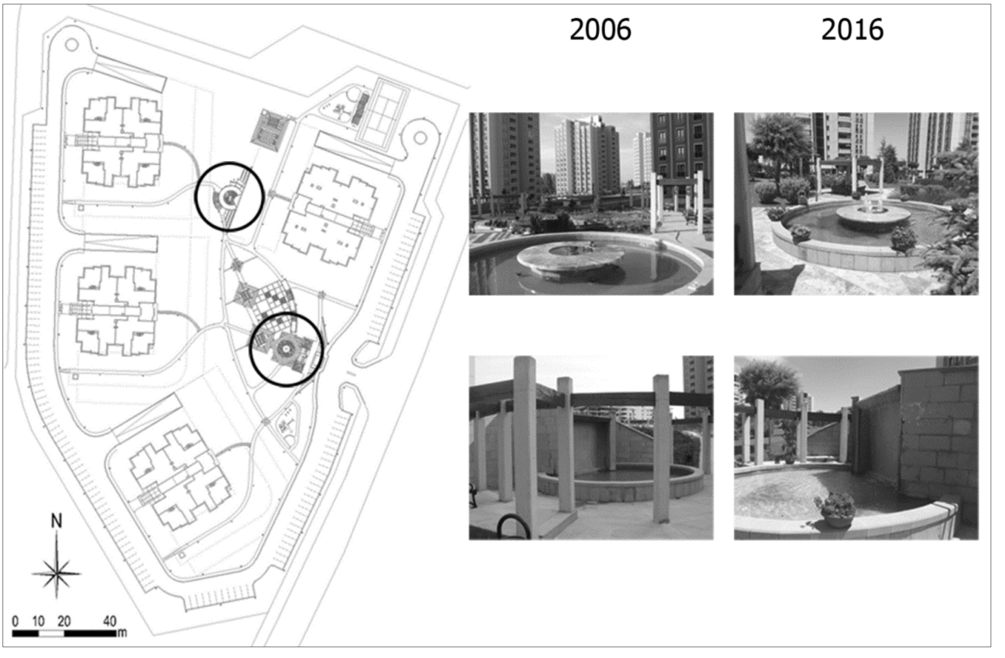

Figure 9: Ornamental pools of the project area

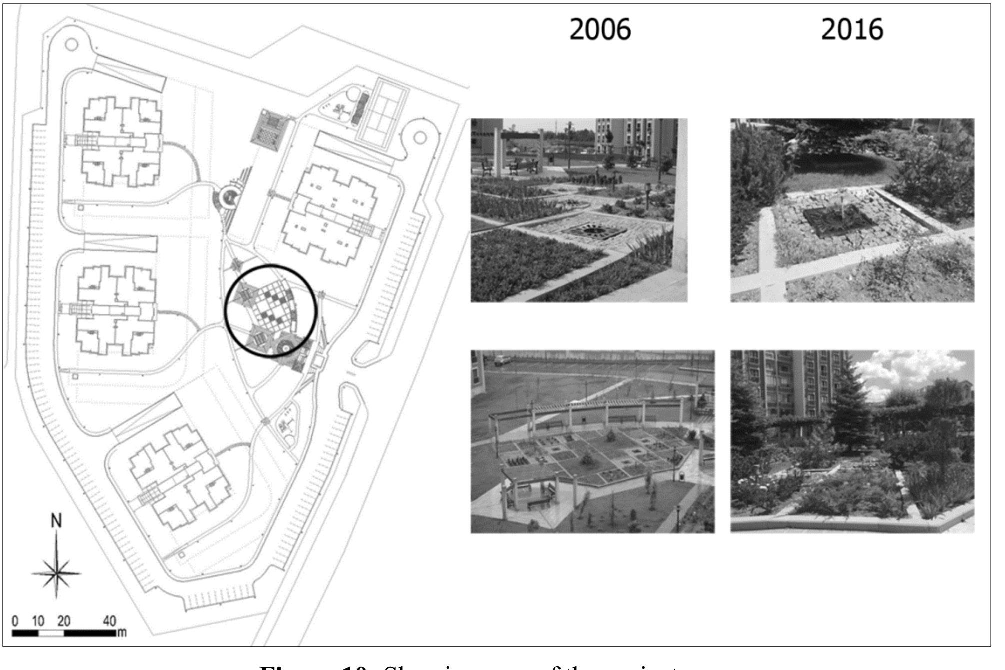

Figure 10: Showing area of the project area

on the main pedestrian route. Different visual effects were generated in each square of the area that is divided into 2x2 m squares by andesite blocks of 20x20 m cross sections. Some squares are reserved for plants and some are reserved for water-shows with a granite laying and cast iron grating. Grass hills consisting of coniferous plants with a pyramid form and illuminated by a projector are suggested in the two squares of 4x4 m dimensions. It was indicated that repairs were made in the electrical and water installation at times by the administration. The visible section is as shown in the design project. Slope stabilizer application was suggested in the project area for keeping and planting slope areas (Figure 11). Slope stabilizers are ready-products manufactured from concrete and they have slope-keeping property in angles varying according to their arrangement.

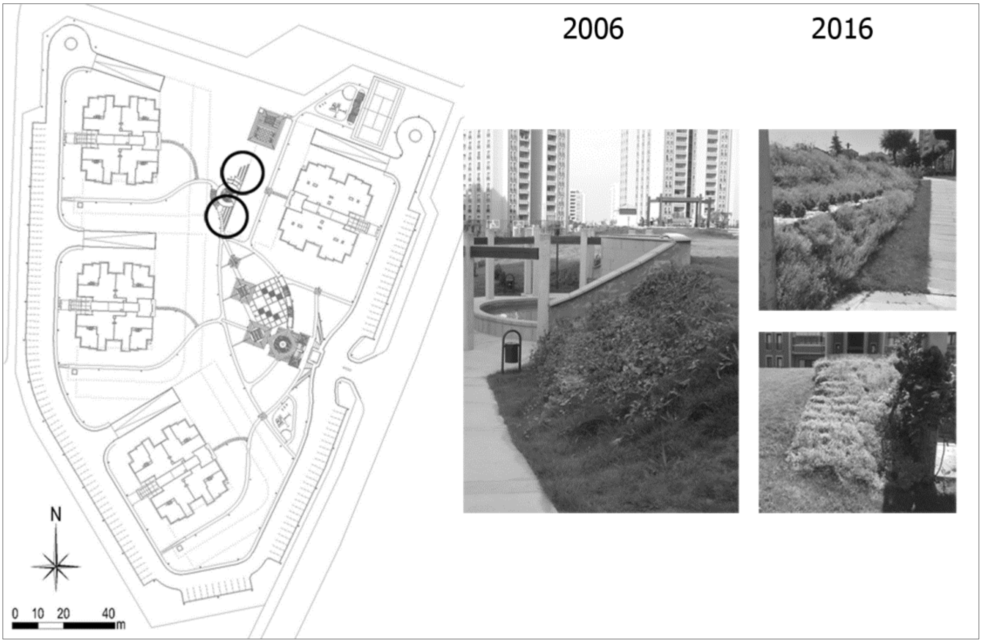

Figure 11: Slope stabilizers of the project area

Fitting components including high lighting, grass lighting, bins and benches were selected from ready products based on the designer and employer wishes, and similar colors were preferred in metal fittings (Figure 12). Bins deformed in time and out of use were replaced by new ones. Wooden fittings of the benches are painted and varnished in certain intervals. In addition, concrete plant cases were added to various places of the area. The ground in playgrounds is covered with a gravel layer of 15 cm thickness. Gravel is used in playgrounds commonly and is flexible and long-lived and could be added easily when necessary within time. It is suggested that compact play components are manufactured from a polyethylene material and the carrier fitting is impregnated wood. The service life of the impregnated wood is much longer than that of the only painted or varnished wood. Play components were designed by wood mostly since it is a natural, warm, aesthetic and safe material. Polyethylene material was preferred in the sections that children use and contact against injuries since it is soft, manufactured in interesting colors and forms and long-lived (Figure 13). The deformed polyethylene parts of the playground components other than the wooden fittings within time by the effect of sun and impacts were replaced. The wooden fittings are long-lived since they are manufactured from impregnated wood.

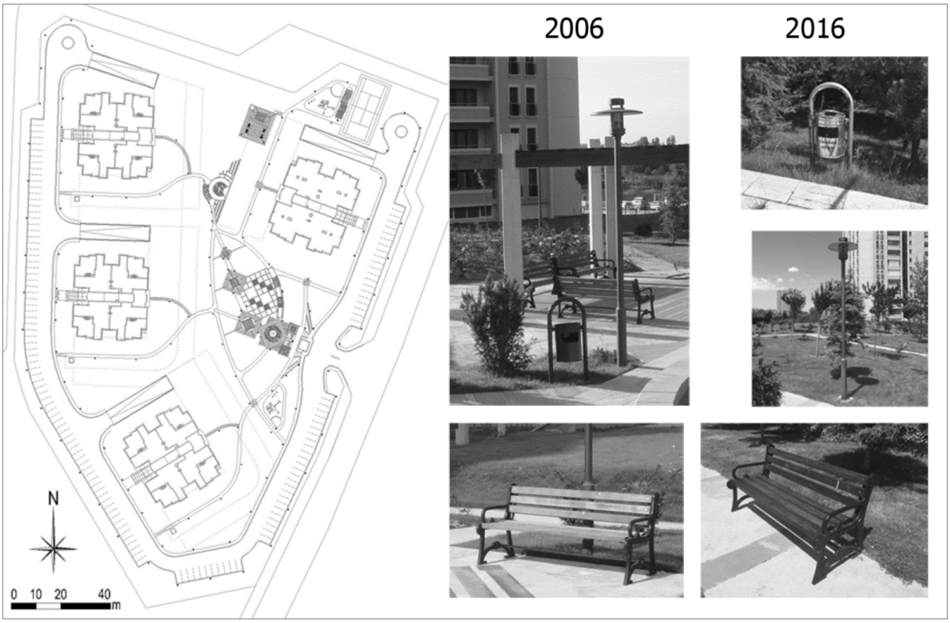

Figure 12: Lighting, bins and benches of the project area

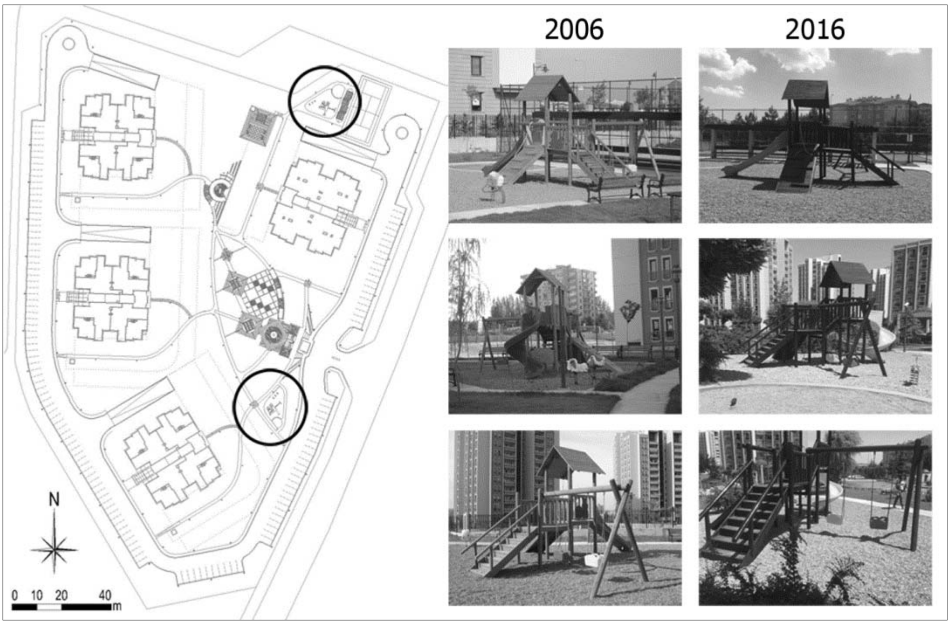

Figure 13: Playgrounds of the project area

The chess area was designed by black and white marble and the surrounding ground was designed by bush hammered andesite and travertine covering (Figure 14). Marble was used in the playground for the chess pieces to move easily on the smooth surface and allowing contrast colors. A tennis court was suggested in the project area as a sports field (Figure 14).

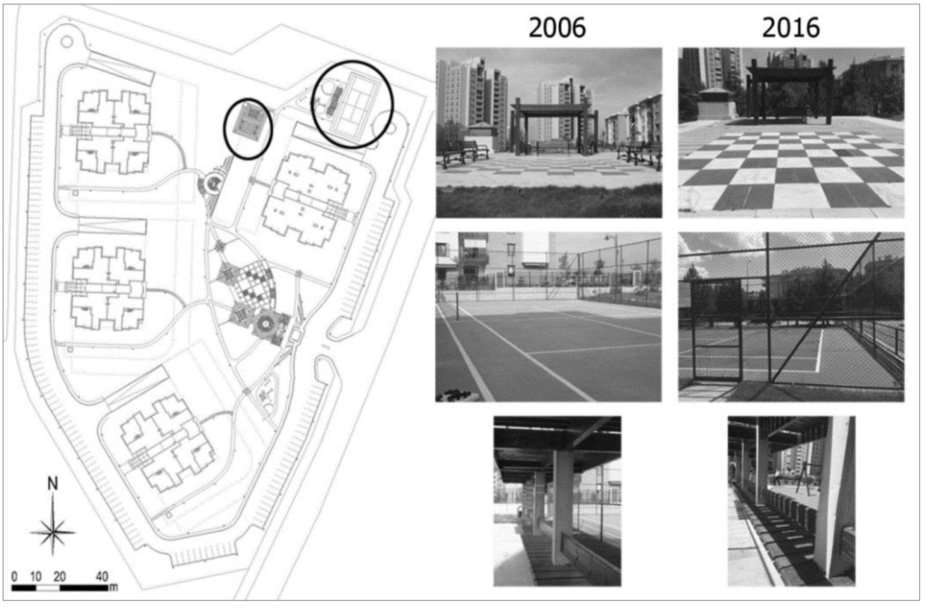

Figure 14: Chess platform and tennis court of the project area

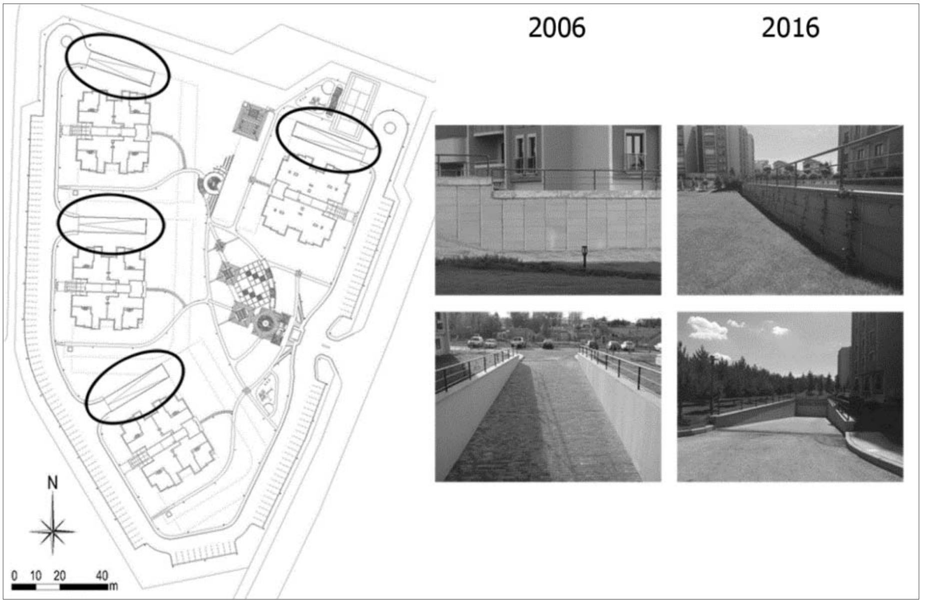

Figure 15: Enclosed garage ramps of the project area

The tennis field ground is made of concrete and the surface and game lines were detailed by acrylic-based paint. It is surrounded by a PVC-coated cage wire mash assembled to the pipe profile skeleton of 4 m height. There is a pergola to serve commonly to the tennis court and playground. This pergola has the same construction with the other pergolas yet it has a different design. Considering the current situation, there is no need for any intervention other than the repainting of the ground.

The dimensions and positions of the open parking areas and vehicle roads within the field were taken from the layout plan of the retified architectural project. The ground was covered with asphalt since it is long-lived, sturdy and flexible against soil settling. The enclosed garage ramps were detailed to be a locked durax-cube pavement by laying sand on top of lean concrete. However, these ramps were turned into a concrete surface by removing the locked parquet during the past 10-year period (Figure 15). The reason for this was the deformation of the ground due to washing of the sand layer under the locked parquet in the sloped area due to the effect of rainwater. The outer surfaces of the garage entry walls are made of andesite mechanical wall cladding. These claddings subsist still sturdily.

A sprinkler irrigation project was made for the irrigation of the turf areas in the project area (Figure 16). The irrigation system was designed as a programmable system operating with a control unit and electrical valves. The used irrigation heads are rotors and spray sprinklers making irrigation by rising with water pressure. There are independent garden faucets to water ornamental plants in the system and to meet water need in the open area when necessary.

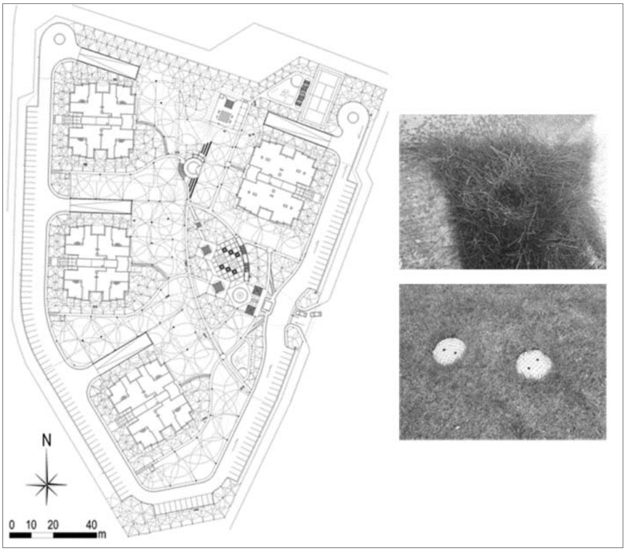

Figure 16: Irrigation project, sprinklers and valve boxes of the project area

The proposed system allows controlled irrigation and night irrigation since it provides homogenous irrigation and is programmable owing to the technical properties and the correct determination of the positions of the irrigation heads, and it is a protected system not visible on the aesthetic surface since it is embedded. Besides, it was aimed to lower the workforce to be used for irrigation to a minimum level. It was reported that the irrigation heads which were broken or had a defective mechanism due to outer factors within time were replaced and the entire system was inspected in the scope of an annual maintenance. The system was functioning as suggested in the design project.

The LPD and Time Effect on It

Plants is used for architecture, aesthetic, engineering and climate control in a landscape design. Trees form the lateral faces of the place in the vertical plane. Shrubs contribute texture, intensity and color to these lateral faces. Places of various height, intensity, texture and color are obtained by the utilization of the plants this way. Canopies of the trees make up the ceiling of the outdoor place. This in turn provides a vertical-scale perception, comfort sense and a shade atmosphere (Seçkin, Seçkin, & Seçkin, 2011). For the plant selection in the project area, the plants were preferred although they are appropriate to the region, are not too demanding in terms of growth environment requirements, easy to take care and with low maintenance cost, they have immense visual effects. Figure 17 shows the LPD project and plant list.

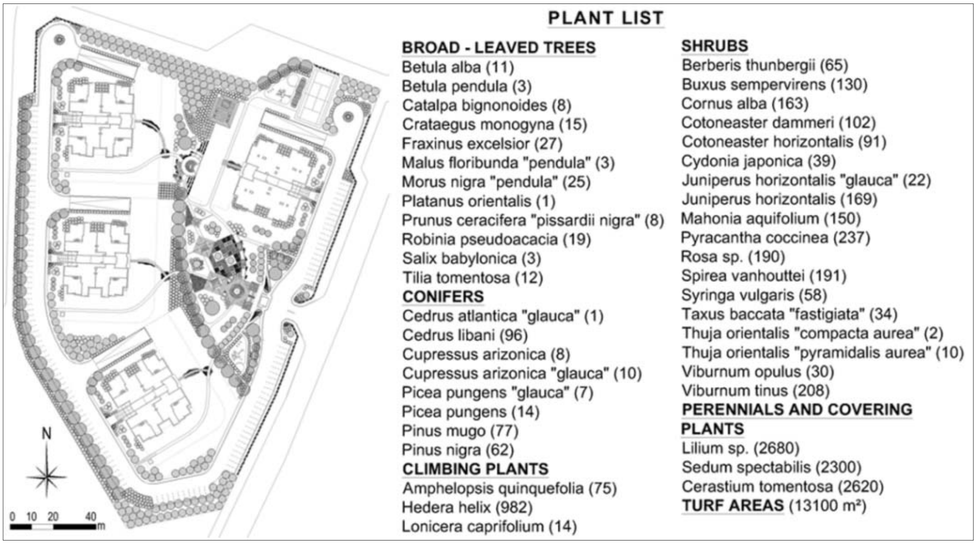

Figure 17: The LPD project and plant list of the project area

The primary functions of the plants included in LPD in the project area are visual acclaim, accenting, directing, shielding, limiting, shading and slope keeping. The main lines of LPD were formed by the placement of broad-leaved trees and conifers. Subsequently, shrubs, climbing and covering plants, perennials and grass areas were added to the design. By considering that the soil depth is 40 cm on top of the enclosed garages, adequate root region depth cannot be provided for many plants, and plant roots can harm the insulation layer, plantation was directed. Perennials, covering plants and turf areas were used in the design of these areas instead of trees and shrubs. Conifers were positioned at the north and south of the area, away from the blocks and close to the enclosure walls as shown in the LPD project. These sections have a width appropriate for generating massive greenery and remaining out of the pedestrian and vehicle circulation. Majority of the broad-leaved trees was used as shade trees along the spring-shaped pedestrian line situated in the middle of the open parking areas and blocks. Conifers of column and pyramid forms were positioned to emphasize the housing development entry and building entries and to create a visual effect in the wide turf areas and the grass hills in the showing area. Conifers and leafed shrubs were used as limiters at the sides and corners of walkways and in the surrounding of the playground, to soften building corners, and as a shield at the front of the walls and to achieve soil stabilization at the slopes. Furthermore, shrubs were included along with the narrow strip surrounding the west and southwest of the area especially in the narrow areas where turf area maintenance would be difficult. Climbing plants were used to make shielding along the enclosure walls and to create shade and visual effect in some pergolas. The covering plants and perennials were positioned to create visual effect at the housing development and building entries and in rock gardens with low soil depth and designed along the step stones and in the showing area. Wide areas were used as a turf area that is possible to be mowed and watered by the sprinkler irrigation system. A seed mixture consisting of four different grass species with a tight structure and resistant to stepping, short mow and harsh winter conditions was suggested for the turf areas.

It was observed in the determination made at the end of 10 years that LPD had more intervention in comparison to LCD, in addition to natural change. When the current state of LPD applied in the area and the plant landscape were compared, it was determined that especially leafed shrubs groups did not reach today and a large section of the conifers and broad-leaved trees continued their existence (Figure 18).

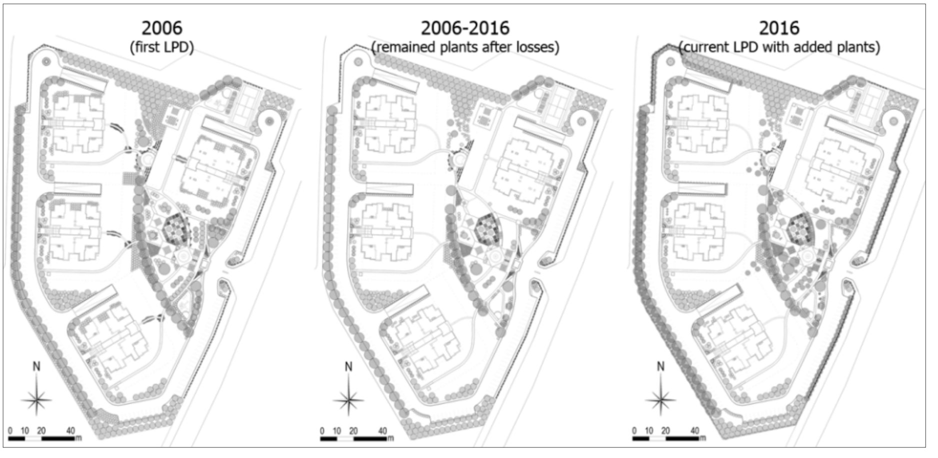

Figure 18: Change of the LPD between 2006-2016

In addition, trees, shrubs, climbing and covering plants and seasonal flowers added by the housing estate administration were seen. Especially the coniferous trees planted afterwards in a row along the parking area have invaded the parking area today and will be invading it in the future (Figure 19a). Climbing plants were added to provide shade in some pergolas and improve the walls visually (Figure 19b, c). Some plants were added to the narrow green area along the enclosure wall. When doing that plants dimensions, when they grow up, were ignored (Figure 19d). Climbing plants were replaced by covering plants in slope-stabilizing plant cases. It was seen that flower pots were placed in various places of the area especially on the hard ground and turf area. It was also seen that some flower beds were built (Figure 19e, f, g, h).

Figure 19: Added plants and pots to the LPD

DISCUSSION AND CONCLUSIONS

Contrary to architectural design, landscape design changes and develops in due course continuously. Upon consideration of the coming years, in fact, a landscape with a completed construction has not been really completed. Landscapes evolve continuously by natural processes, growth and weathering. For instance, plants may blossom, decline and die or not develop as expected. Water, soil conditions, insects, plants, sunlight, weather etc. affect them and it may be necessary to prune, add, substitute or eliminate them (Van Valkenburgh & Saunders, 2013). People also can cause alteration in landscapes. Even well-designed and well-built landscapes can be changed based on user desires. In case a design does not comply with user desires, construction and vegetation may be smashed while users promote their desires (Thompson & Sorvig, 2008). Construction and sustainability stages follow the design stage mainly and maintenance and development of landscapes also depends on them. Cook and VanDerZanden (2011) reported that designers, landscape contractors and landscape maintenance professionals must work as a team for the success of projects during designing and construction. The original design may develop towards a more sustainable landscape sometimes.

Well-designed contemporary residential gardens must be sustainable in terms of LCD and LPD. Such gardens present a quality environment and conductive living area for dwellers. Nevertheless, they are a crucial factor determining both the current and future value of residence. LCD and LPD are made and constructed in the majority of contemporary residential simultaneously. According to Thompson and Sorvig (2008), landscape hard construction aims to support or control plants mostly. Substantial financial investment is necessary for landscape plants whether they are bought, transplanted, or preserved on-site. Healthy plants and the construction are necessary for the constructed landscapes to succeed functionally, ecologically and aesthetically.

The comparison of the garden of Zirvekent Zambak Housing Estate which is considered as the project area in this chapter during 2006-2016 shows that LCD and LPD have reached their SLD target substantially. SLD principles revealed by this review can be summarized as follows:

Design must be functional as much as possible not to be a need for subsequent additions and interventions.

Expectations of dwellers from a garden must meet their physical and emotional needs.

It must provide an adequate and effective pedestrian circulation.

Green space and hard ground ratio must be within acceptable limits.

It must consist of ergonomic usages fitting the human scale.

It must have a construction with an easy and possible maintenance and repair in the long run.

Durable, long-lived, easily found material unique to the region must be used.

Operation costs in the long term must be as low as possible.

Plants that fit the area’s ecology must be selected.

Plants that could function as shading, shielding, limiting and slope stabilizing as well as being aesthetic must be used.

Plants must be positioned in the area according to their form and sizes.

Plantation must be easy to maintain in the long term.

An effective irrigation system is essential in residential gardens like in all green fields.

Contemporary residential gardens, which have a significant place within urban green field systems, must be designed according to SLD principles and approached in the scope of the collaboration of design, construction and maintenance to achieve sustainable gardens.

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Chapter 52

Assessment of Psycho- Social Effect of Interior Components on User Perception In Terms of Historical Buildings

Çiğdem ÇETİNKAYA*

INTRODUCTION

Historical buildings holding important information about the period that they were constructed, since they become useless because of some reasons or lose their need of use; are staying as idle spaces in the city stock. However, with all of the many historical and cultural values, the pass of these buildings on to the future generations are evaluated as important. The main goal of here is "to preservation". Preservation is to keep the current situation or an object at that instant as possible without disturbing it (Engin, 2009). Also, protection and ensure the survival of the social phenomenon such as customs, traditions, rituals and so on can be accepted as preservation works (Engin, 2009). The concept of preserving "historical buildings" that the study focused on; is an indicator of an effort to preserve the social and cultural values of any society in a similar approach. Otherwise, it is clear that communities are losing their uniqueness of their architecture and the cities are transforming into the same building stocks.

There are certain problems in the process of preserving and transferring historical buildings for future generations. These are;

1) Physical deteriorations of building
2) Invalidity of function of building
3) Mismatch between function of the building and surrounding environment

Historical buildings have become useless for the reasons mentioned above. Useless of a building means that unprotected and forgotten in a sense. These buildings can be private property, industrial buildings or cinema, theatre, public office etc.

Adaptive re-use

Since becoming useless with the reasons like physical decay, invalidity of functions or mismatch with new functions of region, "Adaptive re- use" is presented for the historical buildings which were served with different functions to their users at the time they were in use.

Adaptive reuse; can be defined as providing the use of valuable historical buildings that cannot be used in the current situation for any reason, with protecting the physical structure of them and evaluating with a new function (Kaşlı, 2009). With an another definition, to present historical buildings to the use of people with keeping its form and content and giving a new function (Köse, B. & Çalışır, 2012).

As seen in the present, the lifestyle of people has been changing within the years. Change in the lifestyle affect their houses and spaces they are living in their social life respectively. Over time, this change appears in the demographic, socio-cultural

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structure of society, affect the physical structure. Thus, the society is going to change the environment according to their own request and adaptive re- use is chosen by societies. Similarly, Perez De Arche states that adaptive re- use is an important aspect for urban environments as it has so many advantages like usability for a long period, decreasing the cost, continuity in life and creating a sense of space both in past and present (Plevoets, 2014). In relevant with these reasons and more in general, the reasons for adaptive re- use can be grouped under four main headings; socio- cultural reasons, economic reasons, political reasons and constructional reasons.

Socio- cultural reasons: Social and cultural characters of societies affect each other. Social structure shaped by the common cultural values, has a say on the formation of social environment. The change or stability of the customs and traditions that make up the cultural heritage of the community in time, is interacting with individuals' social needs and transforming the social environment. These transformations bring the change of spaces with it.

In addition, the preservation of historical buildings is seen to be valuable in terms of a concrete historical indicator on the point of ensuring cultural continuity and transferring the historical awareness to the society (Engin, 2009).

Economic reasons: Re- use of a building with some specific interventions are quite affordable compared to the construction of a new building. Among the reasons are; do not need a new area in the existing land use in the city, less logistics costs, and can be considered to have an advantage in many expenses such as workmanship and time (Çetinkaya, 2015).

Adaptive reuse, also provide economic gains in the operation phase of the building. The structure is built by considering the local data (topographic, climatic, etc.) of the area at that point, is reducing the likely energy consumption of the building (Çetinkaya, 2015). Besides, historical buildings attract the great deal of attraction of today’s users, especially in this sense can be achieved gains in spaces open to public.

Political reasons: Regaining of historical buildings with adaptive re- use to the society, have a great contribution to national and international prestige of countries.

Thanks to today's technology, fast transportation and communication has become quite easy. Therefore, countries can monitor all the developments in other countries easily. The countries preserving their historical values and present their historical buildings to the society with adapting and re-using with this aim, will be gaining positive value on the national and international platform.

Constructional reasons: Constructional needs including aesthetic and physical functions are one of the other reasons requiring adaptive re- use. The unique character of architectural elements in building, the value of natural and artificial lighting and difference in volume etc. are some of the important reasons for adaptive re-use.

But in that point the relation between “to preserve” and “to use” has to be balanced precisely. The main aim of the use is to preserve. So, using is only a medium for preservation. Thus, all the interventions should be limited as possible (Gönül, 2010).

There are many different approach on the method and priorities of adaptive re- use of historical buildings. For instance, French architect Eugène-Emmanuel Viollet-le-Duc believed that the form of the building is more important than the cultural or sensual values. But in contrast, the architect Viollet-le-Duc states that the restoration of a building maintaining its original properties in meanwhile, it should change and adapt itself to the new use. Le- Duc also supports the idea of reimagining original building with the building structure and design features. In similar with these researchers, one of the contemporary architects Ada Louise Huxtable considers that the success of preservation can be assessed how to be used again instead of how to be a seen as a museum piece (Vackier, 2014).

In the lights of these thoughts, this study propose four criteria to preserve in the process of adaptive re- use. These are:

- Architectural language
- Structural elements
- Physical structure
- Volumetric order of the building.

Besides of these properties; the current location of the building, the harmony of the new function with this location and environment are the crucial variables. This issue is gaining importance especially in adaptive re- use of industrial buildings. The increasing urban population due to the education, health, technology and other facilities is caused to the expansion of the city limits. Therefore, fields delimited as industrial zones in the past, remain in the city center. However, the change of functions in the city center in time leads to remains of these buildings inactive. Thus, should be given importance to the harmony of the new function to the environment of these buildings and all historical buildings in general.

Even though, some constructional and definitional changes in spaces are seen in the flow of time, the effort of user to reach places where he performs the actions in the most efficient way are continuing in every time period. In this context, user is waiting from the space primarily to meet their needs for physical use that can be considered as basic needs, then waiting for the needs on the psychological aspects that meet the requirements to ensure feel good himself (Erniş Yıldırım, 2012). Therefore, it is obvious that the relationship between human and space must be dealt with in the physical and psychological aspects.

IMPACT OF THE SPACE COMPONENTS IN HISTORICAL BUILDINGS ON SPATIAL PERCEPTION THROUGH THE DIFFERENT SENSES

In relation with human; space, establish his own indicators according to human's activity and behaviors. How the language transmit human's ideas, also space transmits its message with its indicators (Güç, 2013). Users perceive the space by this indicators. Although, indicators are the items conveying a particular purpose, they are not always sparking off same reactions. At this point; previous experiences of the individual, the current psychological and physical condition when is perceived and the environment effect the change in perception. So, the "space in real" and "perceived space" are differ from each other. Spatial perception defines the process which human transmits with combining impulses received from the environment via senses and his previous experiences and finally create a logical whole. By this way, information getting from space become more permanent, link with other information in memory and contribute to human's progress. In the process of acquiring information from the environment, five senses are assisting human. Human is the multi-dimensional entity communicating with his environment by these senses. Seeing, hearing, smelling, tasting and touching are enriching the relation of human with space. Therefore, in first stage, only in the nature of physical impulse, spatial components are transmitted to different dimensions (Güç, 2013).

It is considered that the most effective way of perception is visual perception. But, seeing limits the imagination of human and leads the loss of infinity of production through the intangible nonexistent and to comment on just visible one.

Individuals in visual perception, recognize and perceive the space with the readiness in line with previous experiences (Findlay, J.M. & Gilchrist, 2003). In response, he perceive the space with the help of other senses through the components of space.

In addition to physical entity, space has also its sound. The sound which is delivered to users via space's components is called "acoustics". Variables such as dimensions of surfaces in space, their volumetric relations, order and number of furnishing compose acoustic in space. Space acoustic changes the effect of space on human. By means of spatial acoustic, space can be perceived as scary, inclusive, relaxing and enjoyable etc. In spatial perception, a difficult estimated one but at the same time much more effected perception is "perception by tasting". The perception of tasting has an intimate relation with visual and tactual perception. During seen, not only colors or forms, also oral senses are stimulated (Holl, S. , Pallasmaa, J.& Perez- Gomez, A., 2006).

Occasionally, human's relationship with space by touching, is closer than seeing. Experiments are concerned for discovering environment unconsciously by closing the eyes to perceive space. Therefore, the human body can perceive solid and voids with touching and experience the space (Holl, S. , Pallasmaa, J.& Perez- Gomez, A., 2006).

It is considered that all spaces have their own scent. Especially, images of the spaces we carry from our childhood memory to today, are not even in our memories; their scents are unforgettable for us. If a similar scent is sensed at another place, even if passed so long, images of that space or small details remind us that space. As it is seen, another way of perception in relation between human and space is the scent.

When the feelings and accordingly behaviors effected on human perception of space are considered, also the effects of spaces on human began to be questioned. Questions such as "how space will create an effect on user", "how it will create the desired effect" lead us to "spatial components". Spatial components; are the spatial factors responsive to at first, physical factors such as breeding, sleeping and nutrition; secondly psychosocial factors such as security, belonging, esteem and sociability.

In historical buildings, besides of these expectations, another expectation for understanding the link of space is considered. Historical space is a meta providing cultural, conceptual and psychological link between yesterday and today.

That' why the impact of spatial components, indicators of space, on space through the five senses were evaluated in this study.

METHODS

In the context of this study, at first, the reason of preservation of historical buildings, advantage of adaptive re- use at that point and the reasons and criteria of adaptive re- use were examined. And then, questioning the effects of space components like time, color, texture and material, volume order and size and layout of furniture on human perception through five senses were continued.

1. Time- space relation: the effect of time on perception of space can be considered from two different point of view. Space is a dynamic and living entity with its physical, conceptual and emotional aspects. It completes its mobility with users' movements. While the user participating to space, experiencing the space through its components; the time- space relation directs user's perception. Thus, experience in each of the space will open another areas on user's memory.

Another important case in time- space relation is the link of space with its past. This situation is quite critical for historical buildings and it is becoming more critical due to the reflection of historical, social and cultural structure of past to the present spaces under the influence of time. One of the reasons of thinking historical building as valuable and attractive is the fact that impossibility in turn back of time. Therefore; readability of time over the space means a journey in time for human, so is the situation becomes impossible to partially possible.

Protecting the tracks of time on historical spaces, all senses should be effective on human. At all level of space, conceptual tracks belonging to past should be kept and they should take the human from that instant to the past. One of the most important tool to transmit messages with providing visibility of concepts are "symbols". These tools sharing social, religious, political, cultural or any individual message over space have an important advantage for space in the adoption by community. The most obvious examples of that is often seen in religious buildings that reflect the memories and instants of war or depict historical religious memories.

2. Color-space relation: In the perception of the color, not only the characteristics of color, also individual and social factors coming from past can be effective. Especially, color choices change with the effect of social behaviors shaped by religious beliefs. For instance, the belief of yellow as sacred in Christianity and the belief of green as sacred in Islam as well, cause to be used these colors in religious spaces.

The function of space is also another criteria of color choice in space. Therefore, in adaptive re- used buildings, sometimes, the colors needed for new function is clashed with the previous one. Color of surfaces or structural elements are generally the original color of materials. Generally these colors are expected to be preserved depending on the protection principles in restoration phase. In this case, the design of the space for the new function should be constructed based on this color.

3. Material and texture- space relation: Property of the material is a major factor of touching with seeing. Surface property of material contacting with human defines "texture". Texture can be perceived in two different ways as visual and tactual. Visual texture has an artificial feature. Even if is perceived by the eyes, it does not evoke any texture when contacting with body. But in tactual texture, can be achieved both visual and tactual sense in together.

Surfaces which mostly felt the textures in historical buildings, are walls facing internal and external of building, roof and floor coverings. Preserving the tactile feature of these surfaces give a distinctive characteristic to the link of historical buildings with users.

Historical buildings have many interventions in the time since they were built. The traceability of layers caused by these interventions give a richness to the tactile properties of surfaces. So, the space can share its time dimension with its users.

4. Volumetric order: The formal expression where solids and voids form by coming together can be defined as "volume". To have a volumetric order, proportional relations of each element forming this order, must be analyzed correctly.

One of the most important issues to be considered in the process of restoration in historical buildings is to protect original volumetric order designed in the original layout.

Without destroying the relation between existing structural system in original layout with main spaces and auxiliary spaces should be adapted to new functions. For this to be true; a function according to the building volumetric order should be decided. Otherwise, the function of space is inappropriate with volumetric structure of building and so, arises some problems in new physical and aesthetic use. Similarly, changing the original structure of the volumetric order dramatically to comply with new functions, causing serious damage to the building's originality.

5. Size and layout of furniture: Human makes choices depending on certain variables while perceiving objects or situations in his environment. This situation, defined as "selectiveness in perception", is caused by the difference of perceived object from the others. This difference is sourced from the reasons like color, size, location and orientation of object and proportion as well. Ratio of the perceived object to the others in the space or to the ratio of the entire space affects the perception of object. Surfaces forming the unity of space and furnishing elements combine with the previous experiences of human and constitute spatial perception. In particular, the role of furnishing elements in the perception of adaptive re- used historical buildings, greatly changing the perception of surfaces.

The concrete nature of historical buildings of the contact with past, is constituted with the environment and the order of its surfaces and volumes. Therefore, not to lose this feature, it is essential to keep these variables. It is encountered with many problems in adaptive- re- used historical buildings due to the unresolved problems about furnishing. Some of those are;

- Failure to adequately described sub-functions of space because of creating space divisions at only floor layer
- To choose improper furniture destroying original structure and architectural style of the building
- Use of ambitious furniture pushing surfaces into the background.

Some of the ways recommended for solving these problems are;

- Defining borders of sub- spaces at both floor- wall and ceiling level
- Using furniture in a way that forefront the original surfaces. For this purpose, one of the recommended method is to use furniture in so obscure way and non-dominant colored (close color with surfaces). And the second recommended method is to use furniture in contrast color and style to surfaces for showing the originality of surfaces.

DISCUSSION AND CONCLUSION

Changes in the socio-cultural structure of the time, the differentiation of lifestyles, the effect of political, economic and environmental factors causes major changes spaces people live in. However, despite the changing conditions, societies have unchanging historical and cultural heritage. Abstract or concrete, passing on these values to the next generation, shows the satisfaction and development of community in social, cultural and psychological aspects.

In this context, passing on historical buildings especially remained idle in city center with a new function, enrich the psycho- social and cultural entity of community. But at that point there are certain criteria have to be determined. These criteria are discussed in detail in the work context; affecting the spatial perception of the individual and thus increasing the conceptual, emotional and physical bond of human with the past. Fulfilling architectural language, elements, main components and volumetric order of building and ensuring its compliance with all environment and requirements of new functions, affect the relationship to be established with user, direct the spatial perception of user.

In order that the process of integration of historical buildings into the society is a successful process, spaces have to address not only to the visual sense of human, also address with 5 senses. These impulses generated and transmitted to each other by senses, are the first step that starts the formation of spatial perception. As stated in the study, required tool or indicators need for giving spatial impulse addressing five senses are “spatial components”.

The multi- dimensional relation of space with time, the perception created by color, material and texture on user, spatial order brought by the harmony of volume and furniture with each other and past are affected on human’s five senses, direct spatial perception in terms of spatial parameters.

In this study, it was argued that a proper coordination established between spatial components and senses will be positively influenced on the perception in the process of adaptive- reused of historical buildings. Accordingly, spatial solutions were shared.

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Chapter 53

Livability and Livable City Image

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LIVABILITY

Livability is literally defined as being suitable to sustain the lives of people in a limited area. Livability indicates the necessity of efficient use of resources, the protection and improvement of existing structures, the development of more secure and appreciated healthy living environment via improving social relations (Beyazıt, 2007).

Livability is intertwined with the concept of quality of life. In Habitat II (1996) report, these two concepts are explained as follows: The quality of life is defined as being able to meet vital needs of people in addition to meeting their continuously changing and growing demands, while livability refers to individual and social well-being and spatial, social and environmental characteristics that will contribute to the feeling of happiness to be a resident of that neighborhood.

There is no direct definition of quality of life indicators, but mainly such characteristics as economic prosperity, health, education, freedom, social relationships and satisfaction can be considered as determining factors (Beyazıt, 2007).

Conditions to ensure livability can vary depending on needs and welfare levels of people and cultural and geographical structure (Keçeli, 2013). However, the properties that many researchers define as the qualified life indicators can be guiding in the measurement of livability.

According to this, the main features of livable cities can be as follows (Beyazıt, 2007):

1. The existence of the social environments in which social relations can be established.
2. Walkability
3. Accessibility
4. Healthy and natural environment
5. Traffic safety and individual security
6. Legibility
7. The existence of socio-cultural activities
8. Ease of movement
9. Identity and preserved historical texture
10. Having aesthetic values
11. Job facilities

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The existence of the social environments in which social relations can be established

Jacobs (1992) says that the biggest mistake in city planning is the removal of "people" from urban areas, especially from the roads. She argues that in order to be meaningful and successful, all designed things should serve the interests of people. At the beginning of the 20th century, she emphasized that the removal of people from the places where the most important social relations established led to various problems, primarily about security and added that city centers in particular were for people. Public open areas and designed pedestrian paths are indispensable parts of livable cities.

Walkability

According to Bradshaw (1993), walkability is a measure that improves the quality of space and should provide four basic attributes. These are;

- A pedestrian-friendly small physical environment: Wide sidewalks, small intersections and narrow vehicle lanes, adequate street furniture, good lighting and unobstructed movement areas.
- The presence of recreational areas, shops, offices, libraries, etc. within walking distances.
- A natural environment to reduce extreme weather events; noise, air pollution and litter-free environment.
- Social and diverse local culture (which forms the basis of social and economic relations by increasing communication between people).

An important reason for moving away from traditional life is that people move away from the environments where they live as a result of failing to meet their needs within walking distance. The fact that roads in large part are planned for the motor vehicles also limits the comfortable and safe movement facility in the allocated areas to pedestrians and this causes people to fail to recognize their immediate environment enough as they are directed to use vehicle transportation (Jacobs, 1992; Steiner & Butler, 2007).

Accessibility

The concept of accessibility must meet two basic requirements:

1. Access to the physical environment (place and the services offered there)
2. Access to information and messages (Official Gazette, 2010).

Access to physical environment may be possible by vehicles but priority is to meet the needs within a walking distance. Only in this way, higher perception of information and access to messages are possible and communication percentage among the people living in the same place and a sense of belonging can be increased accordingly (Jacobs, 1992).

Today, in order to define a place or a service as fully accessible, disabled access must also be provided. Considering the fact that difficulties resulting from incomplete and incorrect urban designs are even experienced by people without any physical barriers, it should be taken into account that the situation would be much more difficult for people with disabilities and a field analysis should be performed according to the principle of equality between individuals (Bekçi, 2012).

Healthy and natural environment

Healthy and natural environment is explained with air and water quality, safe and noise-free environment, life expectancy, the existence of the population in the rate of capacity, protected biodiversity and ecological balance and adequate soft soil and vegetation (André et al., 2001) (Beyazıt, 2007).

When the healthy and natural environment is mentioned, the first element that comes to one's mind is trees. Trees add the forms and colors of nature to the roads and structures by establishing an organic link between structures and places in urban areas where abundant artificial elements exist. In this way, urban places with artificial formal qualifications gain natural features (Gezer & Gül, 2009).

Although cities are built by people, it should not be forgotten that they have a dynamic and delicate ecological structure. The studies regarding ecology have shown that ecology increases urban quality of life, health and aesthetics of a city. Therefore, the protection of the natural environment, the expansion of parks, and conversion of empty or unused former industrial areas into parks or hobby parks are regarded necessary in the reconstruction of destroyed habitats (Aklanoğlu, 2009).

Traffic safety and personal security

It is known that the more the vehicle density increases in an area, the fewer people use there. The speed and density of traffic are a threat to the road safety of pedestrians and drivers. Walking is not considered safe and preferred in the places where the traffic is intense, the speed is over the limits, noise and air pollution exist and pedestrians and vehicles often intersect (Kılınçaslan, 2012).

Legibility

Legibility, which is the visibility of the urban landscape, is the recognition of the parts of a city through itself and it regulated in a consistent texture. A readable city is an area whose districts, boundaries, roads are easily discernible and can be grouped in totality (Lynch, 2010).

The need to recognize and modeling the environment is important in terms of both practical and emotional aspects and its roots dates back to old times. A clear image provides a person not only an ability to act in a quick and easy way but also gives his/her emotional confidence. It is impossible to take pleasure from a mess which does not give any clues connected to the wholeness. It can be said that the most powerful effect of legibility is possible with well-decoded road networks (Lynch, 2010).

Legibility that is provided by roads to some extent can be supported by natural elements in dense urban areas. Trees in cities are used to reinforce the legibility with its many features such as reducing the impact of complexity, covering negative views, providing continuity, completing and emphasizing (Aslanboğa & Gündüz, 1986).

The availability of socio-cultural activities

Cities are cultural areas open to all in different but equal ways. It is difficult to continue their existence without socio-cultural activities for cities where information, cultural activities and all kinds of talents are exchanged. With the increase of social relations, the formation of solidarity, cooperation and a safe environment are ensured. The main thing here is to come together for the activities beneficial for the society (Bektaş, 1999; Erzen, 2015; Jacobs, 1992).

Social dimensions of cities are very important because in contrast to the suburban residential towns, by coming together with the people who belong to different cultures people in cities contribute to their development and the development of other people who they are in contact with. In this way, civilization is developed and progress is achieved in societies. To enter and exit easily the places open to everybody such as public museums, libraries, opera houses, concert halls, cultural activity areas and etc. allows people to feel themselves safe. In this context, the existence of parks, squares and pedestrian areas and to use these places as social cohesion and art practices contribute city citizens to meet each other and support the healthy development of a society (Erzen, 2015).

Ease of movement

Accessibility to the places and services is one of the features that make city life attractive. The complex, overcrowded and unsafe places cause a reduction in the quality of life in a city. Resolved traffic problems, the possibility to arrive the desired location in the shortest and safest route are requirements of a quality of life (Jacobs, 1992; Beyazıt, 2007).

Identity and preserved historical texture

Urban identity can be explained as a set of attributes that makes a city different from others and makes it unique. These values are variable and formed as a result of specific accumulations. Urban identity either strengthens in a positive way or suffers in a negative way according to the changes and developments in people and spaces in time (Turan, 2009).

In another form, the concept of urban identity can be defined as a set of values and meanings attributed to a place by its residents. For example, while Vatican is a religious city, New York is associated with the Statue of Liberty and skyscrapers; Paris reminds us of the Eiffel Tower and Istanbul is known for Hagia Sophia and the Blue Mosque (Wikipedia, 2015).

These identifications and associations are realized with the inclusion of emotional meaning for people about a certain periods structure and environment (Lynch, 2010). On the basis of the confidence and belonging senses lie spaces, buildings and environment that look familiar to people even after many years. Therefore, old buildings and roads are valuable not only because they are beautiful. To establish various historical ties with those having lived in the same places where people live today gives meaning to human existence on earth. That is why, a preserved historical texture is critical in the formation of a city with an identity. This awareness and meaning provide a direct contribution to an increase in the sense of livability. A historical texture with all its complementarily preserved features also includes the natural environment in itself (Erzen, 2015).

Despite all its artificiality, it is important to perceive and experience the reality and the eternity of nature in a city. Although open green areas in a city such as parks and botanical gardens partially meet this need, to experience the naturalness of a stream and topography (mountains, hills, coasts, etc.) is more privileged. All the most important and beautiful cities in the world have gained their fame with the presence of water. The fluidity, reflection, color and sound of water are irreplaceable values and therefore preserved natural components play an important role in the construction of an urban identity (Erzen, 2015).

The areas where citizens live other than their homes and workplaces are the places in which a city identity forms. The availability of areas that offer opportunities for recreational activities apart from sports and arts centers also provides a positive contribution to the urban identity (Tatlıdil, 2009).

That the vehicles incompatible with a historical city texture are used on narrow stone streets without pavements produces negative consequences in terms of pedestrian traffic. Besides, the noise and the exhaust gasses affect buildings as well as people in a negative way (Selçuk & Çubukçu, 2014).

It is not a coincidence that in the cities with identity, people with an urban conscious live. Protecting the historical places that shed light on the city's history and make up important part of cultural heritage and transferring it to future generations is a prerequisite for the formation of collective memory and thereby urban consciousness. Collective memory contributes the citizens to connect the place where they live with a sense of belonging and ownership. This automatically increases the quality of life in these places in question (Banger, 2015).

Having an aesthetic value

Urban environments consist of structures and outdoor elements formed by these structures. The defined relationship between them, fluidity of space, well-constructed spatial transitions and harmony determine the quality of the urban aesthetic. Open and green areas formed by structures and groups of structures, courtyards, gardens, pathways in an urban environment must be gathered to complete negative factors. The lines that form urban environmental surfaces are important in the determination of material, color and texture features of a surface, while features such as the quality of open spaces and wall decorations are significant in the determination of the quality of an urban environment. All the details our eyes can see aesthetically such as urban equipment, lighting elements, stations, billboards, tiles, trees and flowers and so on force us to get an idea of the whole; that is, the aesthetics of the whole is associated with the harmony and functionality of the parts with each other (Erdoğan, 2006).

Job facilities

The realization of all the other conditions is only possible with the provision of employment in urban areas. It is clear that biologically and psychologically healthy individuals are indispensable for the sustainability of the existence of the livable cities (Keleş, 2015; Beyazıt, 2007).

CITY IMAGE

Lynch (2010) likens a city to a work of architecture and argues that the only difference is its larger scale and being perceivable for a long time. Urban image of a city is defined as the sum of people's ideas, beliefs and impressions about a city (Kotler, Asplund, Rein & Haider, 1999) and consists of the processing of information received from various sources over time (Asseal, 1984) (Görkemli, Tekin & Baypınar, 2013).

The components of a city image are roads, borders, regions, node / focus points and marking items. The image of a city strengthens or weakens according to the extent of correct positioning of components, functionality and the social opportunities they offer (Lynch, 2010).

In this context, it can be said that a livable city image is in direct proportion to the main criteria of livability including living as happy and healthy individuals with high social and welfare levels.

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Chapter 54

Design Principles of Earthquake Park

Aysun ÇELİK*, Elvan ENDER**

INTRODUCTION

Physical components of urban life quality include urban infrastructure and social reinforcement spaces. Active green spaces, which are within the scope of these mentioned reinforcements, are of great importance in the context of landscape architecture studies (Bağcı, 2010). The concept of open space is one of the crucial and basic elements of urban fabric and is identified as spaces and empty fields which are not included in architecture and transportation areas (Öztan, 1968). The concept of green space is defined as the surface area either covered or combined with vegetal elements (woody and herbaceous ones) among available open spaces (Akdoğan, 1987).

Open and green spaces consist of reinforcements that meet recreational needs of people and take on tasks in the organic development of the settlements, in the preservation of population ad structure density, in the stabilisation of space use and in the prevention of speculative development in residential areas (Öztürk and Özdemir, 2013). Green spaces, which are an important concept in urban planning, are indisputable elements of urban ecosystem organisation with their functions in establishing mass-space balance within ecological context; in creation of microclimates suitable for human life and in providing physical balance and organic integrity in terms of using spaces with different characteristics (Altunkasa et al. 1995). Besides, they are the public spaces that positively affect the social, physical and psychological state of an individual (Öztürk and Özdemir, 2013). The most important open and green spaces are the parks where people are able to avoid their problems, take a rest and relax, go out for fresh air and participate in several activities (Kesim et al. 2006).

Today cities are developing rapidly without making adequate research and ignoring the losses that can be created by natural disasters (Jang et al., 2004). As a result of this rapid development open spaces and green spaces, which have important functions in urban space, are being destructed (Ender, 2015). Earthquakes having been experienced in the past to the present have not only showed the importance of the use of urban open and green spaces but also made people realise the incompetency of these spaces both in quality and quantity (Atalay, 2008). Open green spaces in areas with disaster risk, prevent blockage and jam during a possible earthquake by reducing building density and correspondingly population and traffic density and provide a storage yard for sheltering during post-disaster period.

The criteria and the procedure for planning urban open and green spaces should be evaluated in terms of both creating a healthy urban environment and living spaces to be

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used after a possible earthquake (Nalbantoğlu and Güzer, 2000). Because people tend to use relatively delicate places such as empty spaces, gardens, parks, parking lots and playfields as safe places after a kind of disaster until they get rid of the initial shock (Özdemir, 2002).

Countries experiencing disasters are obliged to plan pre, during and post-disaster periods in case of experiencing the disaster again. One of the planning practices is identifying earthquake parks that provide people with humanly needs such as gathering, meeting family members and sheltering until the chaos environment that is caused by the disaster ceases. Earthquake parks are multifunctional with their being temporary settlement locations besides having recreational, ecological, economic and social functions. Therefore, they should necessarily take part in disaster management in the risky regions. This study focuses on the importance of earthquake parks within the context of disaster management and suggests the criteria devoted to planning and designing procedures.

THE ROLE OF EARTHQUAKE PARKS in DISASTER MANAGEMENT

It is not possible to avoid earthquakes completely. Therefore, it is vital to be prepared, take necessary measures and prevent or reduce damages. To that end, besides the selection of most appropriate construction materials and technologies, accurate determination of the number of floors it is necessary to create infrastructure-ready earthquake parks and wide open spaces within settlements (Çelik and Erduran, 2011).

The importance of planned urban green areas and parks is increasing in places with the risk of natural disasters. Using spaces that are not suitable for settlement as open-green spaces is a common tendency in urban planning. However, it is not the same for multifunctional spaces such as earthquake parks. Because, after a possible earthquake, people prefer to shelter primarily on open-green spaces. Even if one is caught by an earthquake in a vehicle, it is suggested to stop the vehicle in an open space and stay in the vehicle. Therefore, open spaces consist areas where people feel safe during and after an earthquake.

Activities related to earthquakes can be classified into 5 main phases. These phases can be named as preparation in advance, harm reduction, rescue and first-aid, recovery and reconstruction (National Earthquake Council, 2005). Designing earthquake parks in risky regions is of "Pre-Earthquake Precautions" and these parks are spaces that will be employed in a case of an earthquake so that earthquake victims shall be provided with life activities at a minimum level which will be considered within recovery phase. Open spaces, which are indicators of welfare and life standards in daily life, are of great importance under emergency conditions with their use as emergency access, emergency gathering, air access, storage and distribution of emergency rescue equipment, emergency shelter or temporary housing areas (Atalay, 2008).

Earthquake parks are one of the precautions to be taken in order to avoid panic feeling in people both during a earthquake and post-earthquake period or to overcome this feeling with minimum loss of life and property. They are premeditated and ready to use spaces that ensure the victims of the disaster live in a relatively comfortable way within current conditions. Green spaces where immediate needs of people such as security, gathering, meeting, shelter, water supply, nutrition, sanitation, communication are met, treatments are provided and urban services led can be defined as places where life regenerates.

With designing of earthquake parks, problems such as post-disaster chaos; long lasting residential area selection; opening roads for those areas; providing electricity, water and sewer services; environmental health; unhygienic environment; mud on roads especially during winter and tents soaked in water due to heavy rains, which were experienced with previous disasters, shall not be experienced again. Providing victims, who are injured both physically and mentally, with shelter within a short time and giving them some individual space such as a tent, meeting their social needs and providing them food immediately shall make a great contribution to picking up the pieces (Kara, 2007).

In addition to these mentioned roles of earthquake parts in disaster management, they have a function of preparing people for disasters. For this purpose in these parks, people will be able to teach basic first-aid rules, methods for taking one’s own safety precautions and proper behaviour in terms of search and rescue and response during a post-earthquake period (Çelik and Erduran, 2011). Furthermore, practices shall be performed, deficiencies shall be specified and precautions shall be taken. By this way, a society prepared against earthquake shall be created.

ENVIRONMENTAL CHARACTERISTICS of EARTHQUAKE PARKS

Most suitable places for earthquake parks in cities are urban open-green spaces, hospital gardens, school gardens and university campuses. These spaces also have important functions in providing people, who are reluctant to enter buildings with the psychological pressure of earthquake, gathering area and temporary shelter. While deciding which to assign as earthquake parks and designating locations for ones to be designed, some particular environmental parameters should be considered. These are as follows:

Location of the earthquake park is crucial in order not to face any kind of danger again after a disaster. Interaction with the ground should be considered in designating the location of an earthquake park. The criteria in the issue are, earthquake risk status of the picked location; earthquake zone classification and its position by active faults. The ground structure should not magnify the earthquake intensity felt by people. Alluvial soil and soil with a high sand ratio bare the mentioned risk. Therefore, they shouldn’t be included in earthquake management. Filled grounds, grounds with loose texture and areas exposed to disaster should be avoided.

Earthquake parks should be easily accessible spaces close to both crucial places and the city centre with a strong transport network, which is of great importance for immediate response both during and after the earthquake.

The slope of the area should be suitable for both the natural drainage and drainage of waste water used by the population on it. This rate is between 2% and 4%. If major drainage and erosion control measures are not taken for the area the mentioned rate should not exceed 7% (Sphere Project, 2000). Any kind of rain water and waste water is expected to be drained easily.

Besides, the area should be safe when other disaster risks which might be induced by the earthquake are considered. For this purpose, the morphological structure of the area should be safe and far away from the regions bearing landslide, rain-wash, flood and swamp risks. Swamps and environments with slack water where mosquitos rise should be avoided. Valley plains and stream beds should not be planned as earthquake parks. Park space should be at least 3 metres above the expected water accumulating level in rainy seasons so that the shelters, roads, water storage tanks and sanitation areas shall not be flooded and scoured. Park space should not be within the borders of regions with the risk of Tsunami after a possible earthquake either. The afore-mentioned issues should be considered during disaster planning.

Earthquake parks are facilities with ready to use infrastructural features the aim of which is meeting immediate needs of people in case of an earthquake. Therefore, infrastructures such as clean water for drinking and cleaning; electricity for safety and to ease life; sewage to prevent diseases due to waste water and roads to ensure the transportation of any kind of aid in a timely manner should be ready to use. In the event that mentioned infrastructural features are damaged after the disaster, they should immediately be repaired and put into service.

The soil of the parks should be easily excavated in order to enable the tents to be erected; permeable enough to get rain-water drained and should not be exposed to erosion.

“Climatic characteristics” is another important factor to be involved in earthquake management. Being aware of the duration of hot and cold seasons and climatic characteristics are important while determining indoor and outdoor spaces considering the general climate characteristics, appropriate location and construction material.

Earthquake parks should not be surrounded by tall buildings. Even if the structure itself is not damaged during the earthquake, there will possibly be structures and houses damaged by nearby demolished buildings. In order not to be affected by the situation the park should have a distance from the surrounding buildings which is two times the height of the mentioned surrounding structures. Thus, the possible damage to the environment shall be avoided (Akdur, 2001). Earthquake parks should not be located in industrial zones due to their possible different reactions against earthquakes and environmental threats they possibly cause such as fire, explosion, air pollution and malodour. They should also be far from lamp posts and electric wires. These parks shouldn’t be located on the fields under which water pipes and gas pipelines pass either.

SPATIAL CHARACTERISTICS and DESIGN PRINCIPLES of EARTHQUAKE PARKS

An earthquake park should be appropriately sized to serve the population. Too small sized parks are not suitable for serving as earthquake parks. Following multifunctional sites should definitely be included within earthquake parks (Table 1).

Entrances both for personnel and logistics should be available on earthquake parks so that chaos shall be avoided in case of an earthquake. These entrances should have reserve area considering the risk of sudden blockage. Besides, indoor and outdoor spaces which are ready for training programs such as “Basic Disaster Awareness Trainings” during the whole year should be available.

Successive earthquakes to follow the major one should be kept in mind. Any kind of reinforcements, signs and plates should be placed firmly in earthquake parks so that they don’t cause any danger in case of successive earthquakes and applications should be qualified. Mentioned reinforcements, signs and plates should be made of durable and safe materials that are suitable for all weather conditions. Particularly guide signs should be significant and illuminated. Disorganised applications that restrict the space where they are used, or that cause chaos should be avoided.

Table 1. Multifunctional sites to be included within earthquake parks

Definition	Function in Daily Life	Function in case of an Earthquake
OPEN SPACES		
Heliport	Square, activity field	Emergency patient transfer, other emergency situations
Children's playgrounds	Kid games	Kid games, gathering point for the lost
Amphitheatre	Social activities, concerts, theatre	Computer and internet aided administrative unit, computer centre where records shall be kept
Picnic site	Recreation, entertainment, games	Gathering point for the lost, shelter and tent site, field hospital, kitchen-scullery-laundry tent site
Playgrounds	Games	Gathering point for the lost, shelter and tent site, field hospital, kitchen-scullery-laundry tent site
Sports facilities	Sports	Gathering point for the lost, tent site, soup kitchen, field hospital
Ice-skating rinks	Sports	Supply drop zone, mortuary
Parking lot	Parking lot	Parking lot, distribution point for drinking water-cleaning supplies and other equipment
Greenhouse	Collection gardens, herb exhibition, plant production	Hospital
Skateboard ramps	Roller skate and skateboard track, access for the disabled, bicycle riding, baby carriage	Supply unloading area for vehicles.
Pool	Shallow pond	Tent bathrooms, using the pool water for cleaning and fire extinguishing in case of fire
Large openings	Visual	Tent site, disaster awareness training area, veterinary service area
CLOSED SPACES		
Warehouse	Storage of supplies	Storage area for the supplies
Rainwater harvesting area	Irrigation	Water resource and reserves for the purpose of drinking and cleaning
WC	WC	WC, shower rooms, laundry
Cafeterias	Recreation	Kitchen, food distribution unit, soup kitchen, scullery, communication oriented internet centre, charging units for mobile phones
Buffets	food & beverage	Register centre, counseling centre
Waste yards	waste yard	Waste yards
Religious buildings	religious services	Worship, shelter, first aid
Watch boxes	Security	Generator docking area

These applications should be easily accessible instead. Deficiencies in these matters shall probably increase the negative effects of the earthquake.

Reinforcement elements should be designed and located considering maximum benefit of people in terms of functionality so that earthquake parks can serve their purpose of construction. In this sense, essential reinforcement components of earthquake parks are listed in table 2 with their functions.

Table 2. Essential reinforcement components of earthquake parks

ESSENTIAL REINFORCEMENT COMPONENTS OF EARTHQUAKE PARKS	
Component	**Function**
Cisterns	They meet drinking and cleaning water needs in case of a malfunction in water systems.
Turnstiles	Prevents confluence while supplies are being distributed.
Sitting sets	They can easily be transformed into a form that people can take shelter in case of a crisis
Sound system	Used for the announcement of the news that concerns everybody.
Flashers	Guide people where to go in case of earthquakes that occur at night.
Generator	Used for meeting electric demand, security and for other features that make life easier in case of any possible power failure.
Fountains	Provide drinking water and are used as laundry and washing up sites
Billboards	Used for announcements to enable people reach safely and immediately the service sites to be formed within the earthquake park in the case of any crisis.
Thermal solar systems	Provide the shower rooms, laundry and scullery with hot water.

In order to ensure healthy and high quality life standards in earthquake parks, it is necessary to integrate the planning and design of vegetal elements with the components.

Plant cover on earthquake parks should be so appropriately picked that it should provide shade during summer and relatively reduce the effects of rain and wind during winter and prevent erosion with the roots spread underground as well. Grass areas are advantageous since they prevent dust, dirt, mud and erosion (Akdur, 2001). Trees providing shade with large crowns are able to form shelter site and cause a sense of security by creating a kind of space perception. Plants that grow up in messy forms should not be used because they shall limit the activities by blocking possible passages. Plants that shall cause a kind of slippery texture on the ground with their seeds, fruits, thorns and cones or the plants having poisonous fruits or other parts should not be used either. Also, plants that can shelter flies, beetles, bees, scorpions, snakes and other similar creatures shouldn't be used. Park area should include openings as wide as possible and these openings should not be interrupted with shrubs and rampant plants.

CONCLUSION

Earthquake fact should be prioritised while physically designing urban spaces in countries that are to live with this fact and earthquake parks should be evaluated considering their purpose of reducing earthquake damages.

It is impossible to ignore earthquakes. Therefore, in highly risky regions, it is necessary to designate areas as earthquake parks in the districts with better conditions when geomorphological, geological and geotechnical characteristics are considered and studied on "Settlement Suitability Maps" (Çelik, and Erduran, 2011). While designating Earthquake Park spaces, the earthquake risks should be sensitively considered. In addition to making weakness analysis in terms of earthquakes, an "urban natural threats map" should be created for each city and earthquake parks should be planned, designed and put into practice on non-risky lands.

Neither construction, of buildings not relating with the purpose of earthquake parks nor sale and transfer of the buildings to various organisations should be a matter of discussion (Çelik and Erduran, 2011). This issue should be one of the priorities of the local government and they should cooperate with relevant institutions in order to ensure proper housing. Local governments should designate earthquake parks, which are escape points, primarily at neighbourhood level and inform people about the issue.

Earthquake parks need to organise quickly, immediately after an earthquake. Therefore, trained specialists and local people who know the neighbourhood well should participate in the organisation of these parks. Responsibility limits of the people should clearly be identified.

In conclusion, the fact of earthquake parks is the guarantee of constructing safe urban environments and this fact is also a part of designing modern cities. Disaster management studies that exclude earthquake parks can be deemed as deficient.

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